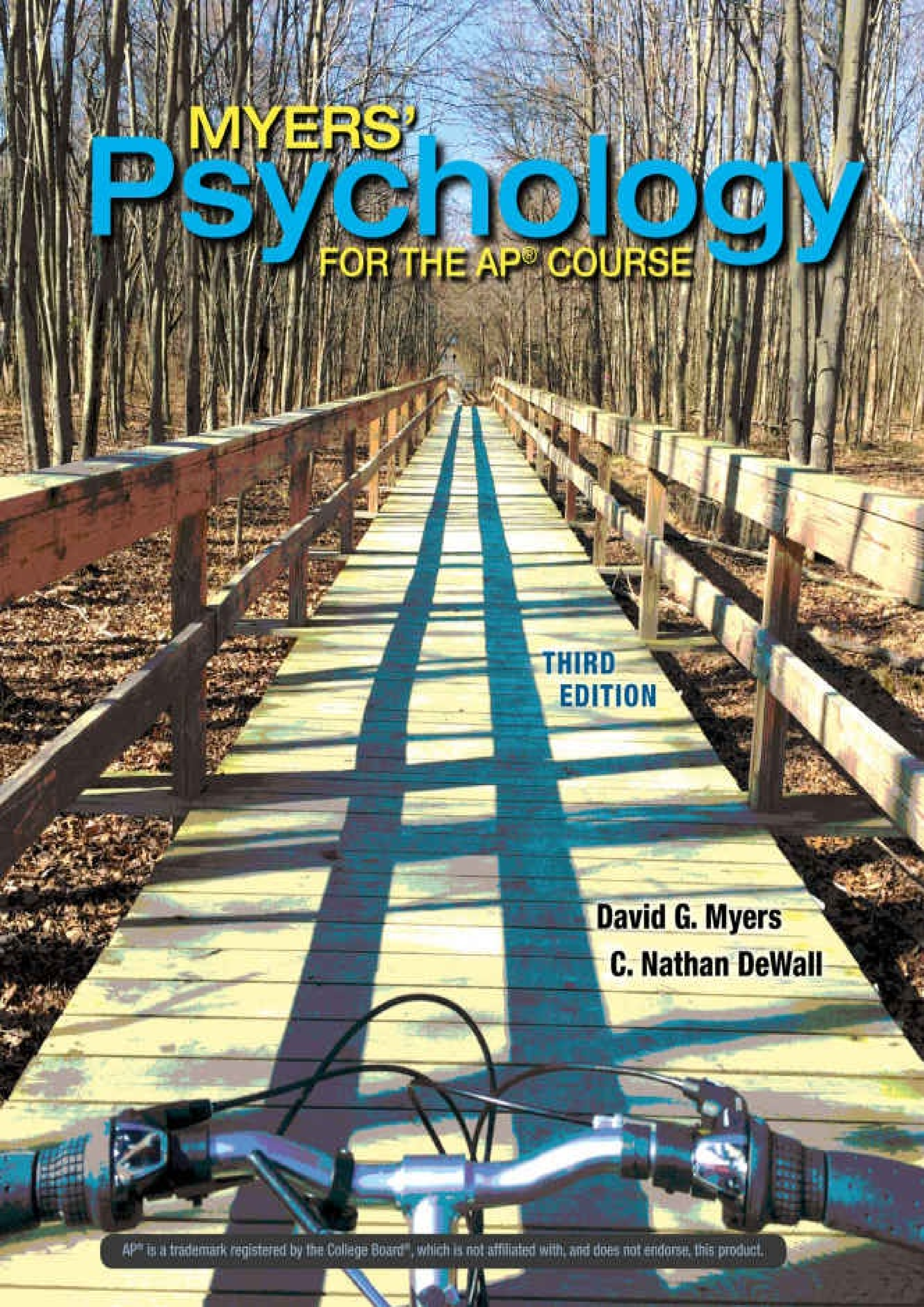

MYERS' Psychology FOR THE AP® COURSE

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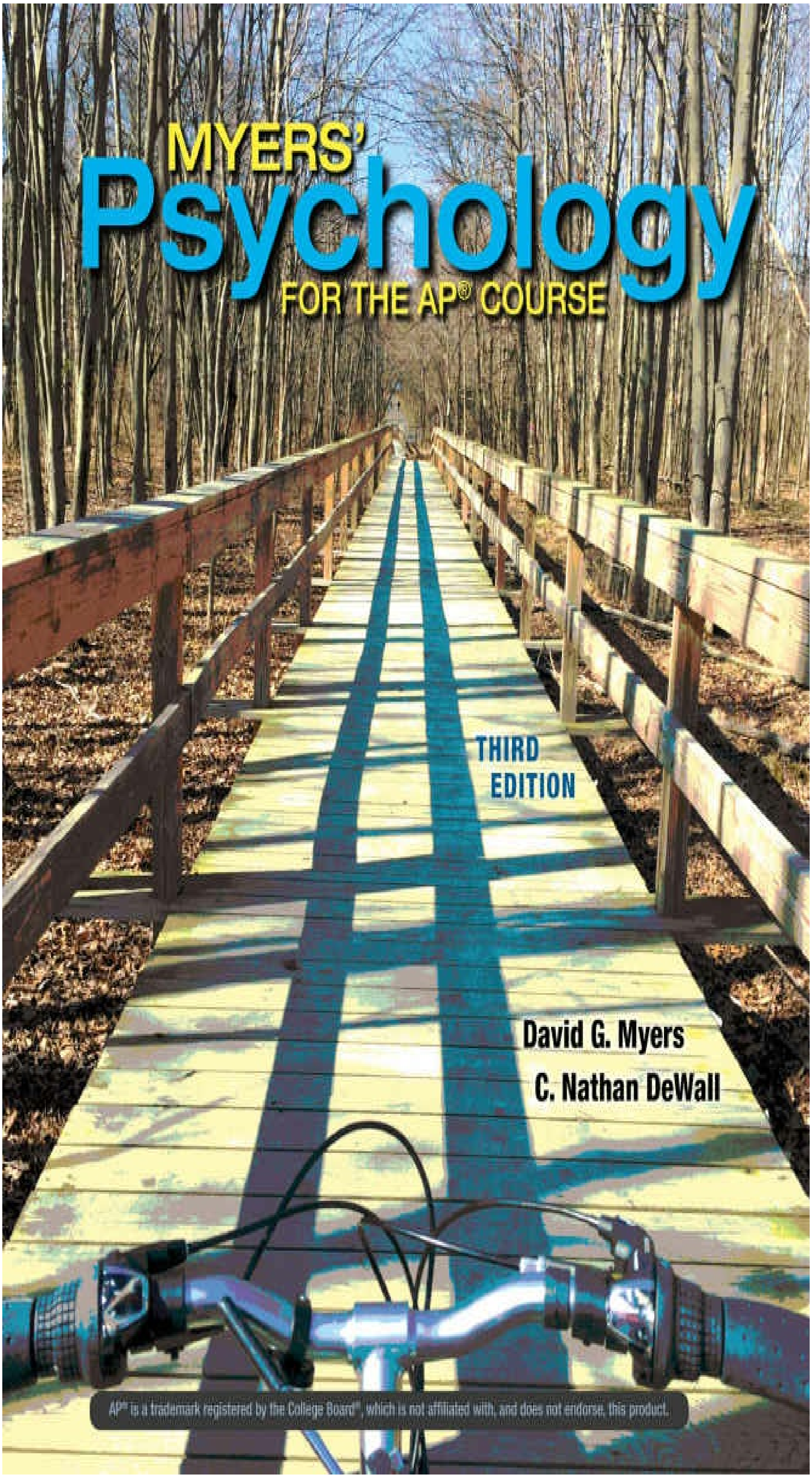

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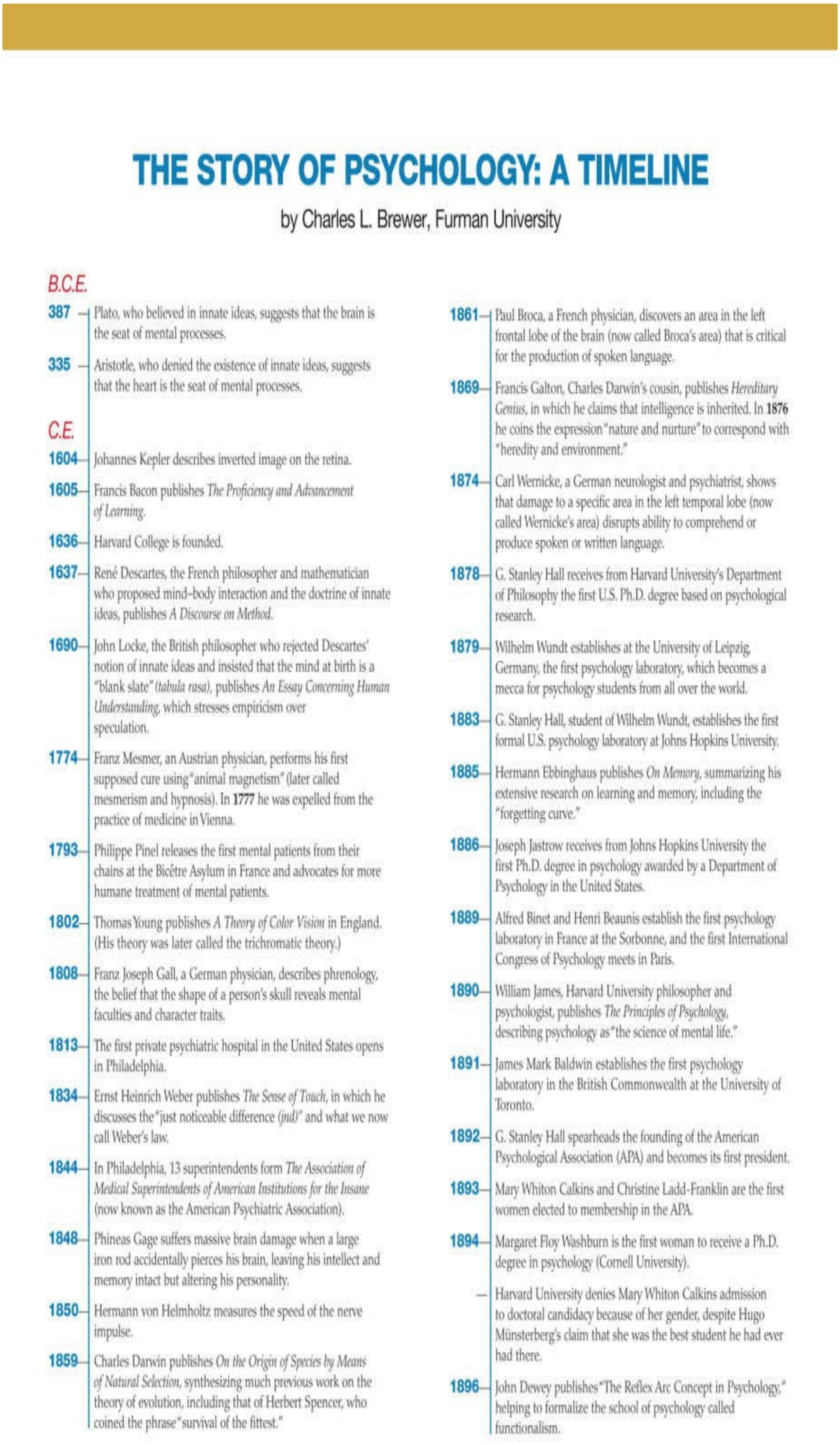

THE STORY OF PSYCHOLOGY: A TIMELINE

by Charles L. Brewer, Furman University

B.C.E.

387 — Plato, who believed in innate ideas, suggests that the brain is the seat of mental processes.

335 — Aristotle, who denied the existence of innate ideas, suggests that the heart is the seat of mental processes.

C.E.

1604 — Johannes Kepler describes inverted image on the retina.

1605 — Francis Bacon publishes *The Proficiency and Advancement of Learning*.

1636 — Harvard College is founded.

1637 — René Descartes, the French philosopher and mathematician who proposed mind-body interaction and the doctrine of innate ideas, publishes *A Discourse on Method*.

1690 — John Locke, the British philosopher who rejected Descartes' notion of innate ideas and insisted that the mind at birth is a "blank slate" *(tabula rasa)*, publishes *An Essay Concerning Human Understanding*, which stresses empiricism over speculation.

1774 — Franz Mesmer, an Austrian physician, performs his first supposed cure using "animal magnetism" (later called mesmerism and hypnosis). In **1777** he was expelled from the practice of medicine in Vienna.

1793 — Philippe Pinel releases the first mental patients from their chains at the Bicêtre Asylum in France and advocates for more humane treatment of mental patients.

1802 — Thomas Young publishes *A Theory of Color Vision* in England. (His theory was later called the trichromatic theory.)

1808 — Franz Joseph Gall, a German physician, describes phrenology, the belief that the shape of a person's skull reveals mental faculties and character traits.

1813 — The first private psychiatric hospital in the United States opens in Philadelphia.

1834 — Ernst Heinrich Weber publishes *The Sense of Touch*, in which he discusses the "just noticeable difference *(jnd)*" and what we now call Weber's law.

1844 — In Philadelphia, 13 superintendents form *The Association of Medical Superintendents of American Institutions for the Insane* (now known as the American Psychiatric Association).

1848 — Phineas Gage suffers massive brain damage when a large iron rod accidentally pierces his brain, leaving his intellect and memory intact but altering his personality.

1850 — Hermann von Helmholtz measures the speed of the nerve impulse.

1859 — Charles Darwin publishes *On the Origin of Species by Means of Natural Selection*, synthesizing much previous work on the theory of evolution, including that of Herbert Spencer, who coined the phrase "survival of the fittest."

1861 — Paul Broca, a French physician, discovers an area in the left frontal lobe of the brain (now called Broca's area) that is critical for the production of spoken language.

1869 — Francis Galton, Charles Darwin's cousin, publishes *Hereditary Genius*, in which he claims that intelligence is inherited. In **1876** he coins the expression "nature and nurture" to correspond with "heredity and environment."

1874 — Carl Wernicke, a German neurologist and psychiatrist, shows that damage to a specific area in the left temporal lobe (now called Wernicke's area) disrupts ability to comprehend or produce spoken or written language.

1878 — G. Stanley Hall receives from Harvard University's Department of Philosophy the first U.S. Ph.D. degree based on psychological research.

1879 — Wilhelm Wundt establishes at the University of Leipzig, Germany, the first psychology laboratory, which becomes a mecca for psychology students from all over the world.

1883 — G. Stanley Hall, student of Wilhelm Wundt, establishes the first formal U.S. psychology laboratory at Johns Hopkins University.

1885 — Hermann Ebbinghaus publishes *On Memory*, summarizing his extensive research on learning and memory, including the "forgetting curve."

1886 — Joseph Jastrow receives from Johns Hopkins University the first Ph.D. degree in psychology awarded by a Department of Psychology in the United States.

1889 — Alfred Binet and Henri Beaunis establish the first psychology laboratory in France at the Sorbonne, and the first International Congress of Psychology meets in Paris.

1890 — William James, Harvard University philosopher and psychologist, publishes *The Principles of Psychology*, describing psychology as "the science of mental life."

1891 — James Mark Baldwin establishes the first psychology laboratory in the British Commonwealth at the University of Toronto.

1892 — G. Stanley Hall spearheads the founding of the American Psychological Association (APA) and becomes its first president.

1893 — Mary Whiton Calkins and Christine Ladd-Franklin are the first women elected to membership in the APA.

1894 — Margaret Floy Washburn is the first woman to receive a Ph.D. degree in psychology (Cornell University).

— Harvard University denies Mary Whiton Calkins admission to doctoral candidacy because of her gender, despite Hugo Münsterberg's claim that she was the best student he had ever had there.

1896 — John Dewey publishes "The Reflex Arc Concept in Psychology," helping to formalize the school of psychology called functionalism.

1898— In *Animal Intelligence,* Edward L. Thorndike, Columbia University, describes his learning experiments with cats in "puzzle boxes." In **1905**, he proposes the "law of effect."

1900— Sigmund Freud publishes *The Interpretation of Dreams,* his major theoretical work on psychoanalysis.

1901— Ten founders establish the British Psychological Society.

1904— Ivan Pavlov is awarded the Nobel Prize for Physiology or Medicine for his studies on the physiology of digestion.

1905— Mary Whiton Calkins becomes the first woman president of the APA.

— Ivan Petrovich Pavlov begins publishing studies of conditioning in animals.

— Alfred Binet and Théodore Simon produce the first intelligence test for assessing the abilities and academic progress of Parisian schoolchildren.

1909— Sigmund Freud makes his only trip to America to deliver a series of lectures at Clark University.

1913— John B. Watson outlines the tenets of behaviorism in a *Psychological Review* article, "Psychology as the Behaviorist Views It."

1914— During World War I, Robert Yerkes and his staff develop a group intelligence test for evaluating U.S. military personnel, which increases the U.S. public's acceptance of psychological testing.

1920— Leta Stetter Hollingworth publishes *The Psychology of Subnormal Children,* an early classic. In **1921** she is cited in *American Men of Science* for her research on the psychology of women.

— Francis Cecil Sumner receives a Ph.D. degree in psychology from Clark University, becoming the first African-American to earn a psychology doctorate.

— John B. Watson and Rosalie Rayner report conditioning a fear reaction in a child called "Little Albert."

1921— Hermann Rorschach, a Swiss psychiatrist, introduces the Rorschach Inkblot Test.

1923— Developmental psychologist Jean Piaget publishes *The Language and Thought of the Child.*

1924— Mary Cover Jones reports reconditioning a fear reaction in a child (Peter), a forerunner of systematic desensitization developed by Joseph Wolpe.

1927— In *Introduction to the Technique of Child Analysis,* Anna Freud discusses psychoanalysis in the treatment of children.

1929— Wolfgang Köhler publishes *Gestalt Psychology,* which criticizes behaviorism and outlines essential elements of the gestalt position and approach.

1931— Margaret Floy Washburn becomes the first female psychologist (and the second female scientist in any discipline) elected to the U.S. National Academy of Sciences.

1932— In *The Wisdom of the Body,* Walter B. Cannon coins the term *homeostasis,* discusses the fight-or-flight response, and identifies hormonal changes associated with stress.

1933— Inez Beverly Prosser becomes the first African-American woman to receive a doctoral degree in psychology from a U.S. institution (Ph.D., University of Cincinnati).

1935— Christiana Morgan and Henry Murray introduce the Thematic Apperception Test to elicit fantasies from people undergoing psychoanalysis.

1936— Egas Moniz, a Portuguese physician, publishes work on the first frontal lobotomies performed on humans.

1938— B. F. Skinner publishes *The Behavior of Organisms,* which describes operant conditioning of animals.

— In *Primary Mental Abilities,* Louis L. Thurstone proposes seven such abilities.

— Ugo Cerletti and Lucio Bini use electroshock treatment with a human patient.

1939— David Wechsler publishes the Wechsler–Bellevue intelligence test, forerunner of the Wechsler Intelligence Scale for Children (WISC) and the Wechsler Adult Intelligence Scale (WAIS).

— Mamie Phipps Clark receives a master's degree from Howard University. In collaboration with Kenneth B. Clark, she later extends her thesis, "The Development of Consciousness of Self in Negro Preschool Children," providing joint research cited in the U.S. Supreme Court's **1954** decision to end racial segregation in public schools.

— Edward Alexander Bott helps found the Canadian Psychological Association. He becomes its first president in **1940**.

— World War II provides many opportunities for psychologists to enhance the popularity and influence of psychology, especially in applied areas.

1943— Psychologist Starke Hathaway and physician J. Charnley McKinley publish the Minnesota Multiphasic Personality Inventory (MMPI).

1945— Karen Horney, who criticized Freud's theory of female sexual development, publishes *Our Inner Conflicts.*

1946— Benjamin Spock's first edition of *The Commonsense Book of Baby and Child Care* appears; the book will influence child raising in North America for several decades.

1948— Alfred Kinsey and his colleagues publish *Sexual Behavior in the Human Male,* and they publish *Sexual Behavior in the Human Female* in **1953**.

— B. F. Skinner's novel, *Walden Two,* describes a Utopian community based on positive reinforcement, which becomes a clarion call for applying psychological principles in everyday living, especially communal living.

— Ernest R. Hilgard publishes *Theories of Learning,* which was required reading for several generations of psychology students in North America.

1949— Raymond B. Cattell publishes the Sixteen Personality Factor Questionnaire (16PF).

— The scientist-practitioner model of training is approved at The Boulder Conference on Graduate Education in Clinical Psychology.

continued on inside back cover

Correlation Guide for *Myers' Psychology for the AP® Course*, Third Edition

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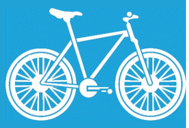

THIRD EDITION

David G. Myers
Hope College
Holland, Michigan

C. Nathan DeWall
University of Kentucky
Lexington, Kentucky

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Dedication

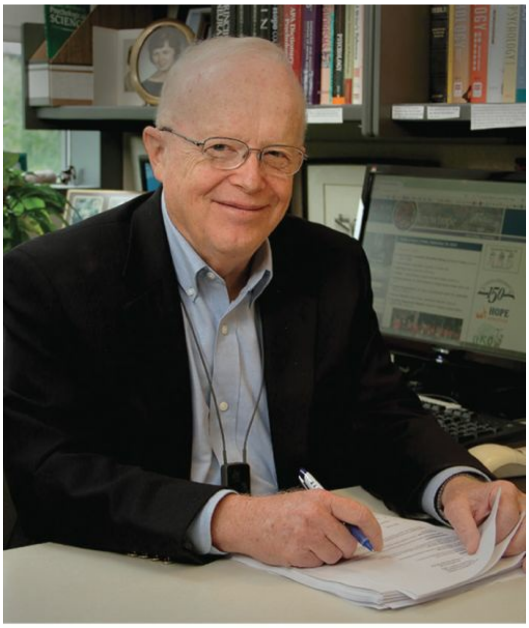
To Janie Pierce-Bratcher, with gratitude for her enduring encouragement and support of our teaching mission.

DM

To Erica (DeWall) Corner: Loving sister, caring mother, gifted teacher and photographer.

ND

About the Authors



Hope College Public Relations

David Myers received his B.A. in chemistry from Whitworth University, and his psychology Ph.D. from the University of Iowa. He has spent his career at Hope College in Michigan, where he has taught dozens of introductory psychology sections. Hope College students have invited him to be their commencement speaker and voted him “outstanding professor.”

His research and writings have been recognized by numerous awards and honors, including the Gordon Allport Intergroup Relations Prize, an Honored Scientist award from the Federation of Associations in Behavioral & Brain Sciences, an Award for Service on Behalf of Personality and Social Psychology, a Presidential Citation from APA Division 2, election as an American Association for the Advancement of

Science Fellow, and three honorary doctorates. With support from National Science Foundation grants, Myers' scientific articles have appeared in three dozen scientific periodicals, including *Science*, *American Scientist*, *Psychological Science*, and *American Psychologist*. In addition to his scholarly and textbook writing, he reports on psychological science for the general public. His writings have appeared in four dozen magazines, from *Today's Education* to *Scientific American*. He also has authored five general audience books, including *The Pursuit of Happiness* and *Intuition: Its Powers and Perils*.

David Myers has chaired his city's Human Relations Commission, helped found a thriving assistance center for families in poverty, and spoken worldwide to hundreds of college, community, and professional groups. He has also spoken to many high school groups, including AP® psychology conferences, an AP® psychology reading, Teachers of Psychology in Secondary Schools, the National Council for Social Studies Psychology Community, and the 2017 APA Summit on High School Psychology Education. David has twice offered AP® psychology workshops in China, and he served on the APA's working group that created the 2010 revision of the *National Standards for High School Psychology Curricula*.

Drawing on his lifelong experience, David has written articles and a book (*A Quiet World*) about hearing loss, and he is advocating a transformation in American assistive listening technology (see HearingLoop.org). For his leadership, he has received awards from the American Academy of Audiology, the hearing industry, and the Hearing Loss Association of America.

David and Carol Myers met and married while undergraduates. They have raised sons Peter and Andrew, and a daughter, Laura. They have one grandchild, Allie (seen on page 484).

J.A. Laub Photography, LLC

Nathan DeWall is professor of psychology and director of the Social Psychology Lab at the University of Kentucky. He received his bachelor's degree from St. Olaf College, a master's degree in social science from the University of Chicago, and a master's degree and Ph.D. in social psychology from Florida State University. DeWall received the College of Arts and Sciences Outstanding Teaching Award, which recognizes excellence in undergraduate and graduate teaching. The Association for Psychological Science identified DeWall as a "Rising Star" early in his career for "making significant contributions to the field of psychological science."

DeWall conducts research on close relationships, self-control, and aggression. With funding from the National Institutes of Health and the National Science Foundation, he has published over 190 scientific articles and chapters. DeWall's research awards include the SAGE Young Scholars Award from the Foundation for Personality and Social Psychology, the Young Investigator Award from the International Society for Research on Aggression, and the Early Career Award from the International Society for Self and Identity. His research has been covered by numerous media outlets, including Good Morning America, *The Wall Street Journal*, *Newsweek*, *The Atlantic Monthly*, *The New York Times*, *The Los Angeles Times*, *Harvard Business Review*, *USA Today*, National

Public Radio, the BBC, and *The Guardian*. He has lectured nationally and internationally, including in Hong Kong, China, the Netherlands, England, Greece, Hungary, Sweden, and Australia.

Nathan is happily married to Alice DeWall and is the proud father of Beverly ("Bevy") and Ellis. He enjoys playing with his two golden retrievers, Finnegan and Atticus. In his spare time, he writes novels, watches sports, tends his chickens and goats, and runs and runs and runs. He has braved all climates—from the snowy trails of Michigan to the scorching sands of the Sahara Desert—to complete over 1000 miles' worth of ultramarathons—including the Badwater 135 in 2017 (dubbed "the world's toughest foot race").

Content Advisory Board and Supplements Team

Creating this book is a team sport. Like so many human achievements, it is the product of a collective intelligence. For this edition, we were fortunate to collaborate closely with an expert Content Advisory Board throughout the development process. The Content Advisory Board understands the needs of the AP® psychology teacher and student. They provided helpful direction on how to make the content relevant, engaging, and appropriate for a high school classroom. Board members provided sage guidance on key content, organizational, and pedagogical issues and ensured that the end-of-module and end-of-unit assessments provide the practice students need for the questions they will encounter on the AP® exam. We extend gratitude and admiration to each of these talented educators and assessment writers for their enduring contributions to the teaching of psychology.

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Charlie Blair-Broeker taught psychology to over 1500 high school students from 1978 to 2014 at Cedar Falls High School, and he is now an adjunct instructor at Hawkeye Community College. Charlie is one of only two people who have been at every annual AP® psychology reading since the AP® exam was first administered in 1992. He has been a question leader, rubric writer, table leader, and reader for the AP® psychology exam; completed a three-year term on the AP® Psychology Test Development Committee; and led dozens of teacher workshops on AP® psychology across the United States and Canada. Among Charlie's teaching awards are the Grinnell College Outstanding Iowa Teacher Award, the University of Iowa Distinguished Teacher Award, and the APA Division 2 Teaching Excellence Award.

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Laura Brandt has taught AP® psychology since 1997 and has been involved with the AP® psychology reading since 1999, serving as a reader, table leader, and question leader. She also works for the College Board® to facilitate sessions for AP® psychology teachers. Currently, Laura also teaches AP® psychology online through the Center for Talent Development at Northwestern University.

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Kimberly Cruz has been teaching high school for nearly 20 years in schools recognized by the College Board® for exemplary AP® programs and cutting-edge virtual schools. She has been a professor at Palm Beach State University and worked with Nova Southeastern University to host community programs that promote psychology. Kimberly is an AP® psychology College Board® consultant and has been an AP® psychology reader and exam question writer. She has spoken at the AP® Annual Conference three times on “Staying Positive about Teaching Biological Bases of Behavior” and the Local Advanced Placement Credentialing program from Broward County Public Schools. She has won the TOPSS Teacher of the Year Award and the Florida Social Studies Teacher of the Year Award.

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High school psychology teacher Dr. Randy Ernst was a member of the initial AP® Psychology Test Development Committee and served as a question leader and exam leader at the annual AP® psychology reading. In 2017, the APA awarded Randy a Presidential Citation for his “leadership, vision, and commitment to the teaching of psychology at the high school level.” Randy has run dozens of workshops on the teaching of psychology across the United States, Canada, Australia, and several other countries. A founding board member of TOPSS, he was elected chair in 1995. Randy co-authored the National Standards for High School Psychology Curricula, co-chaired the 2017 APA Summit on the Teaching of High School Psychology, and is the co-author of the high school on-level textbook *Thinking About Psychology* with his dear friend, Charlie Blair-Broeker. He retired from secondary education in 2016 and became a college professor.

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Nancy Fenton has taught high school psychology since 2004. She has served as a reader and table leader at the AP® psychology reading and as a College Board® consultant since 2014. She teaches AP® psychology at Adlai E. Stevenson High School and online for the Center for Talent Development at Northwestern University. Nancy was awarded the 2013 APA TOPSS Excellence in Teaching Award for dynamic teaching and commitment to the advancement of psychology and has presented at regional and national conferences for AP® psychology teachers. Nancy is the co-author of the review book *AP® Psychology All Access*, co-author of the blog *Books for Psychology Class*, and co-author of the iScore5™ Psych app.

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Vivian Ferry has taught psychology at various levels for the last 35 years and began the AP® psychology program at her high school in 1992. She is a member of TOPSS and was the state coordinator for Rhode Island Teachers of Psychology (RITOP). Vivian helped to develop activities and lessons for classroom integration at the inception of the AP® test by the College Board® in 1992. As an adjunct faculty member, Vivian was awarded the *Excellence in the Teaching of Psychology* at the Community College of Rhode Island, where she continues to teach general psychology.

Vivian also continues to teach AP® psychology at Mount Saint Charles Academy.

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Accuracy Checker

An award-winning teacher, Dr. Amy Fineburg chaired the TOPSS Committee, served as a reader and then table leader at the AP® psychology reading, chaired the APA working group that created the 2010 *National Standards for High School Psychology Curricula*, and co-chaired the Steering Committee for the APA Summit for High School Psychology Education. She wrote the 2003 edition of the *Teacher's Guide for AP® Psychology*. She has contributed articles to AP® Central and is a frequent workshop presenter and consultant for AP® Coordinators for the College Board®. She has been an adjunct instructor in psychology at Samford University and in educational psychology for the University of Alabama. She is the Advanced Programs Specialist for Jefferson County Schools leading AP®, dual enrollment, and virtual learning programs for Alabama's second-largest school district.

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Jessica Flitter has taught AP® psychology since 2004. She has been involved with the AP® psychology reading since 2013, serving as a reader and table leader. Among her teaching awards are the Rolf's Educational Foundation Teacher Award and the APA TOPSS Charles T. Blair-Broeker Excellence in Teaching Award. Jessica is also co-author of the review book *AP® Psychology: All Access*.

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Joe Geiger has been teaching high school psychology since 1995, and he entered the world of AP® psychology in 2002. He has been a regular presenter at the National Council for the Social Studies conference for the past 14 years. Currently, Joe serves as a vice chair for the National Council for the Social Studies Psychology Community. He also sits as a member of the House of Delegates for the National Council for the Social Studies.

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Dr. Liz Yost Hammer is the director of the Center for the Advancement of Teaching and Faculty Development, and a Kellogg Professor in Teaching at Xavier University of Louisiana. A social psychologist by training, she regularly teaches introductory psychology, research methods, health psychology, and human sexuality. Her research interests focus on the scholarship of teaching and learning, and she has contributed chapters to several books intended to enhance teaching preparation. In addition, she is a co-author of the textbook *Psychology Applied to Modern Life*, now in its twelfth edition. She is a past president of Psi Chi and a past treasurer of the Society for the Teaching of Psychology. She joined the AP® psychology reading in 1998 and served as chief reader from 2012 to 2016.

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KENT KOREK

Germantown High School, WI

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Kent Korek has taught psychology since 1978 and AP® psychology since its inception in 1992. Beginning in 2005, Kent has been invited annually to serve as a reader or table leader for the AP® psychology reading. Endorsed as a College Board® consultant in 2004, he has conducted numerous one-day workshops and week-long AP® summer institutes in the United States and Canada. Kent served on the AP® Psychology Development Committee from 2010 to 2014 and continues to write questions for the AP® psychology exam. Kent participated in the 2017 APA Summit on High School Psychology Education as part of the Technology and Online Learning Strand. He has been awarded the Herb Kohl Fellowship, recognizing teaching excellence and innovation in the State of Wisconsin.

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Dr. Rob McEntarffer is an award-winning psychology teacher who has taught at both the high school and college level. Rob became an AP® psychology reader in 1995, was promoted to table leader, and served as a question leader from 2004 to 2010. He chaired the Assessment Committee at the Psychology Partnerships Project, co-chaired the Assessment Committee at the 2017 National High School Psychology Summit, co-authored *How to Prepare for the Advanced Placement® Psychology Exam*, and won the 2004 Moffett Memorial Teaching Excellence Award. Rob currently works as an assessment specialist for the Lincoln Public School

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Nate Naughton is the vice principal for academics at Arlington Catholic High School. Nate has taught AP® psychology since 2001 when he began his school's AP® psychology program. Nate has served as an AP® reader since 2008. He is also an adjunct faculty member at Park University, teaching history and liberal education courses online.

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Debra Park taught psychology at West Deptford High School for 33 years. Her teaching awards include Gloucester County Teacher of the Year, Rutgers University Public School Educator of the Year, APA Award for Excellence in Teaching Psychology, and the Moffett Memorial Teaching Excellence Award. In 2011 she received an APA Presidential Citation for her outstanding contributions to the organization. She has presented at the APA/Clark University Workshop for High School Teachers, and she has served as the Membership Committee Chair for STP Division 2 (Teaching of Psychology) and as a reader for the AP® psychology reading. Debra has taught psychology and behavior management courses for Rutgers University for the last 17 years. In 2017 she participated as a co-leader for the APA Summit on High School Psychology Education.

HILARY ROSENTHAL

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Hilary Rosenthal has been teaching AP® psychology since 1995 in the

Glenview, Illinois, area and was named Distinguished Teacher by Glenbrook South High School. She has been part of the annual AP® psychology reading as both reader and table leader starting in 1997. She was part of the APA's working group to revise the *National Standards for High School Psychology Curricula*. Hilary served on the board and acted as chair of the TOPSS committee.

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Dr. Joe Swope has been teaching AP® psychology since 2002. He has participated in the AP® psychology reading since 2010. In 2013, Joe was awarded the APA's Excellence in Teaching Award and has worked with the APA on curricula development. In 2017, Joe presented at the psychology teachers' conference at Clark University. He has also presented at conferences where he focused on integrating technology into psychology instruction. Joe is an adjunct professor at two community colleges where he has taught a variety of psychology courses.

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Virginia Welle has been teaching AP® psychology since 2005 and has served as a reader for the AP® psychology reading since 2012. She holds a master's degree in psychology with a specialization in counseling psychology, and she served on the TOPSS Executive Committee from 2013 to 2015. In 2016, Virginia was a recipient of the APA TOPSS Charles T. Blair-Broeker Excellence in Psychology Teaching Award. She was also recognized by the Herb Kohl Foundation with a prestigious Kohl Teacher Fellowship in 2017.

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In Appreciation

Our gratitude extends to the colleagues who contributed criticism, corrections, and creative ideas related to the content, pedagogy, and format of the twelfth edition of our college text, *Psychology*. For their expertise and encouragement, and the gifts of their time to the teaching of psychology, we thank the reviewers and consultants listed below.

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To the Student

How to Get the Most From Your Psychology Text for the AP® Course

The Advanced Placement® (AP®) psychology course represents a wonderful opportunity for you to be challenged by the rigor of a college-level course, while learning life-relevant, mind-expanding concepts from the humanly significant discipline of psychology. Our unwavering vision for this text has been to *merge rigorous science with a broad human perspective that engages both mind and heart.* We aim to offer a state-of-the-art introduction to psychological science that speaks to your needs and interests. We aspire to help you understand and appreciate the wonders of your everyday life. And we seek to convey the inquisitive spirit with which psychologists *do* psychology.

This third edition continues to build on our trademark: a readable, relatable textbook that effectively prepares students for the AP® psychology exam by keeping true to the College Board® course description, with new research and student-relevant discoveries throughout. We aim for clear and concise explanations and a conversational tone that hopefully encourages you to read, and enjoy, the content. The third edition is organized by units and modules. Each unit corresponds to the fourteen key topics in the College Board® outline for the AP® psychology course. Within each unit, we have divided the content into short, manageable **modules** that provide bite-sized chunks of content to study. Each module is organized by clear and measurable **Learning**

Targets that orient you to the material you are about to read and allow you to "check off" each objective as you master it.

Be sure to take advantage of all that this text has to offer. You can learn a lot by simply reading the text, but you will develop deeper understanding by completing the many Review Questions and self-assessment activities along the way. The walkthrough guide on pages xxv–xxviii gives you an inside look at the important features of the text.

In Unit I, we discuss the importance of "retrieving" what you've read and then "reviewing" what you've learned by testing yourself. Researchers have found that self-testing, and regularly engaging with "desirable difficulties" are great ways to learn and remember. This book offers many different types of self-tests and learning opportunities for you:

- **Check Your Understanding** boxes, found at the end of major sections of text, include **Ask Yourself** questions, which encourage you to apply new concepts to your own experiences (thus making them more meaningful and memorable), and **Test Yourself** questions (with answers in Appendix E) that assess mastery and encourage big-picture thinking.
- **Try This** features sprinkled throughout the text allow you to connect more deeply with the concepts you're learning by putting them into real-life practice.
- **Module Review Questions** appear at the end of each module. Try the Multiple-Choice Questions that address the key concepts from each Learning Target, as well as a Practice FRQ (Free-Response Question) to assess your mastery of the module's content.
- **Unit Review Questions** offer a cumulative assessment on concepts learned throughout the entire unit.
- **The Practice AP®-Style Exam** at the end of the book covers material learned throughout the entire course and simulates the real AP® psychology exam.

AP®-Focused Elements

In addition to providing you with a rich introduction to the field of psychology, *Myers' Psychology for the AP® Course* is designed to help you prepare for the AP® psychology exam. That is why we have expanded on the following AP®-specific tips and guidance:

- **AP® Exam Tips,** found in the margin throughout the text, provide invaluable advice on where to focus and how to avoid pitfalls so that you may be successful in the course and on the exam. These tips also appear compiled in Appendix B at the end of the book.
- More **AP® exam practice** is provided in the numerous, high-quality multiple-choice questions and FRQs found at the end of each module and unit. These assessments not only test the material learned, but they also mimic AP® questions to train you for what you will see on the exam. The open-ended, conceptual FRQs familiarize you with the kind of synthesis skills you'll need to master the exam.
- A **full-length AP®-style practice exam** is included at the end of the text to ensure you have nailed down the content and are ready to tackle the real test in May.
- A **Key Terms List** appears at the end of each unit to remind you of the important terms that were bolded and defined in the marginal glossary throughout the modules. These terms highlight the vocabulary you'll need to master for the AP® exam. These terms are also defined in the English and Spanish **Glossary/Glosario** at the end of the book.
- A **Key Contributors list** appears at the end of each unit to highlight the most important people you should know in psychology. You can access the **Psychological Science's Key Contributors** appendix (Appendix C) at the end of the text and the *Key Contributors Study Guide* on the Student Site to be sure you are familiar with these core contributions to psychology. Access the Student Site at **highschool.bfwpub.com/myersap3e**.

Skills for Life After High School

In its findings and photos, this text presents a cross-cultural perspective on psychology that explains human similarities and differences throughout the world. We hope this helps you leave high school as more compassionate global citizens.

We also aim to introduce you to critical thinking. The text offers many opportunities for you to *learn critical thinking skills* and to better *understand research design principles*—both of which are essential to success on the AP® exam and will also be invaluable skills to have in your college courses.

- Unit II, Research Methods: Thinking Critically With Psychological Science, introduces you to **critical thinking** and to psychology's **research methods,** emphasizing the fallacies of our everyday "common sense" thinking and, thus, the need for psychological science. The Statistical Reasoning discussion encourages you to focus on thinking smarter by applying simple statistical principles to everyday reasoning.
- **Critical examinations of key issues in psychology** appear throughout the narrative to spark interest and provide important lessons in thinking critically about everyday topics and pop psychology. (Consider, for example, the critical analysis of the Effects of Viewing Media Violence on page 317.) There are also numerous infographics throughout the text that encourage thinking critically about important topics. They may be found on the following pages:

  Thinking Critically About: The Scientific Attitude, p. 3

  Thinking Critically About: Correlation and Causation, p. 52

  Thinking Critically About: Using More Than 10 Percent of Our Brain, p. 114

  Thinking Critically About: Subliminal Sensation and Subliminal Persuasion, p. 164

  Thinking Critically About: Tolerance and Addiction, p. 254

  Thinking Critically About: The Effects of Viewing Media Violence, p. 317

  Thinking Critically About: Can Memories of Childhood Sexual Abuse

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Thinking Critically About: Therapeutic Lifestyle Change, p. 752

Thinking Critically About: The Internet as Social Amplifier, p. 788

Looking for videos, animations, and other helpful digital resources?

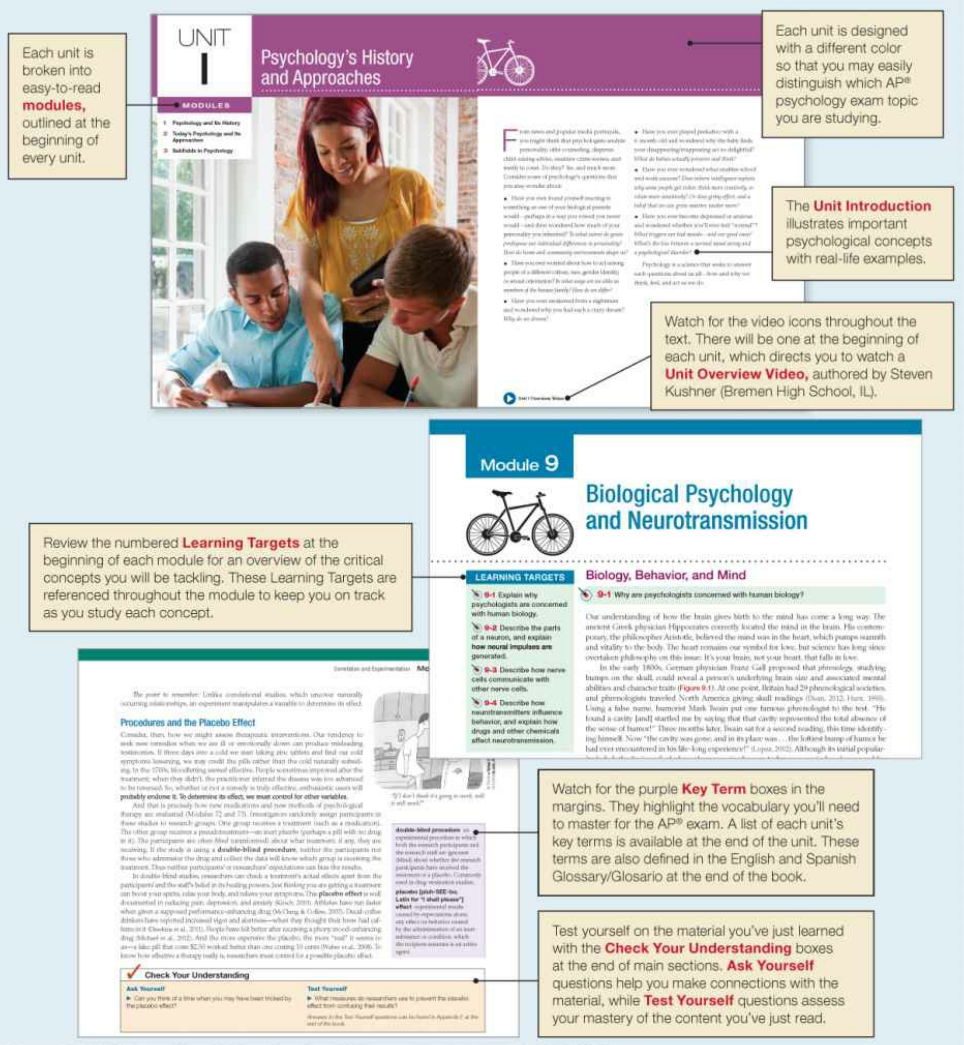
Go to: highschool.bfwpub.com/myersap3e

And select “Go to Student Site” from the menu.

Go to Student Site

Tools for Learning . . .
Getting the Most From This Book

Each unit and its modules are structured with a common set of features designed to engage you for effective learning.



Each unit is broken into easy-to-read **modules,** outlined at the beginning of every unit.

Each unit is designed with a different color so that you may easily distinguish which AP® psychology exam topic you are studying.

The **Unit Introduction** illustrates important psychological concepts with real-life examples.

Watch for the video icons throughout the text. There will be one at the beginning of each unit, which directs you to watch a **Unit Overview Video,** authored by Steven Kushner (Bremen High School, IL).

Review the numbered **Learning Targets** at the beginning of each module for an overview of the critical concepts you will be tackling. These Learning Targets are referenced throughout the module to keep you on track as you study each concept.

Watch for the purple **Key Term** boxes in the margins. They highlight the vocabulary you'll need to master for the AP® exam. A list of each unit's key terms is available at the end of the unit. These terms are also defined in the English and Spanish Glossary/Glosario at the end of the book.

Test yourself on the material you've just learned with the **Check Your Understanding** boxes at the end of main sections. **Ask Yourself** questions help you make connections with the material, while **Test Yourself** questions assess your mastery of the content you've just read.

UNIT
I
Psychology's History and Approaches
MODULES
Module 9
Biological Psychology and Neurotransmission
LEARNING TARGETS
Biology, Behavior, and Mind
Procedures and the Placebo Effect
Check Your Understanding

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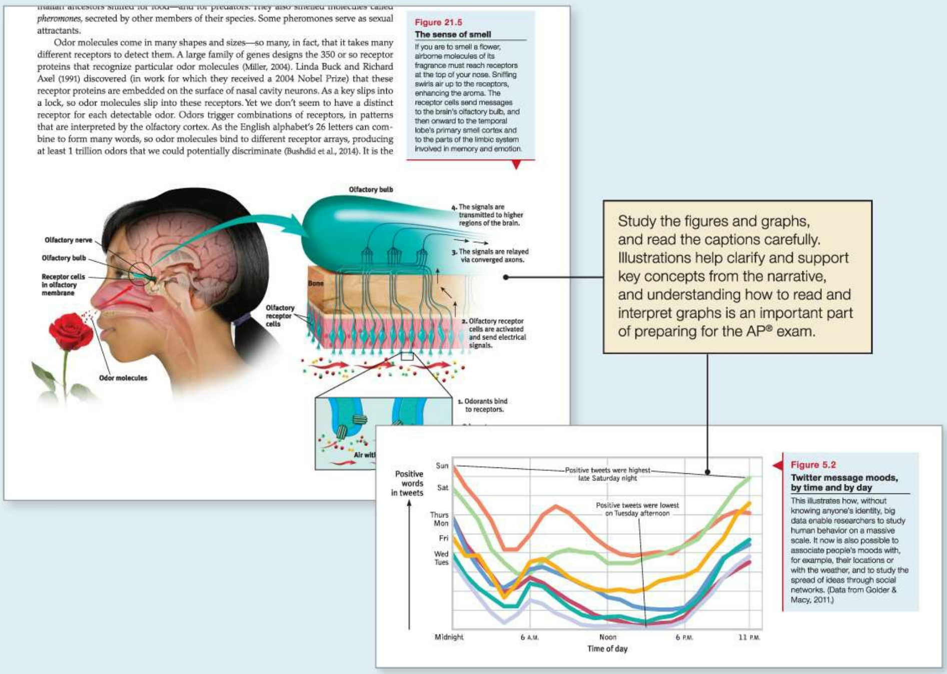

pheromones, secreted by other members of their species. Some pheromones serve as sexual attractants.

Odor molecules come in many shapes and sizes—so many, in fact, that it takes many different receptors to detect them. A large family of genes designs the 350 or so receptor proteins that recognize particular odor molecules (Miller, 2004). Linda Buck and Richard Axel (1991) discovered (in work for which they received a 2004 Nobel Prize) that these receptor proteins are embedded on the surface of nasal cavity neurons. As a key slips into a lock, so odor molecules slip into these receptors. Yet we don't seem to have a distinct receptor for each detectable odor. Odors trigger combinations of receptors, in patterns that are interpreted by the olfactory cortex. As the English alphabet's 26 letters can combine to form many words, so odor molecules bind to different receptor arrays, producing at least 1 trillion odors that we could potentially discriminate (Bushdid et al., 2014). It is the

Figure 21.5
The sense of smell
If you are to smell a flower, airborne molecules of its fragrance must reach receptors at the top of your nose. Sniffing swirls air up to the receptors, enhancing the aroma. The receptor cells send messages to the brain's olfactory bulb, and then onward to the temporal lobe's primary smell cortex and to the parts of the limbic system involved in memory and emotion.

Olfactory bulb
4. The signals are transmitted to higher regions of the brain.
Olfactory nerve
Olfactory bulb
Receptor cells in olfactory membrane
3. The signals are relayed via converged axons.
Bone
Olfactory receptor cells
2. Olfactory receptor cells are activated and send electrical signals.
Odor molecules
1. Odorants bind to receptors.
Air wit
Positive words in tweets
Sun
Sat
Thurs
Mon
Fri
Wed
Tues
Positive tweets were highest late Saturday night
Positive tweets were lowest on Tuesday afternoon
Midnight
6 A.M.
Noon
6 P.M.
11 P.M.
Time of day

Study the figures and graphs, and read the captions carefully. Illustrations help clarify and support key concepts from the narrative, and understanding how to read and interpret graphs is an important part of preparing for the AP® exam.

Figure 5.2
Twitter message moods, by time and by day
This illustrates how, without knowing anyone's identity, big data enable researchers to study human behavior on a massive scale. It now is also possible to associate people's moods with, for example, their locations or with the weather, and to study the spread of ideas through social networks. (Data from Golder & Macy, 2011.)

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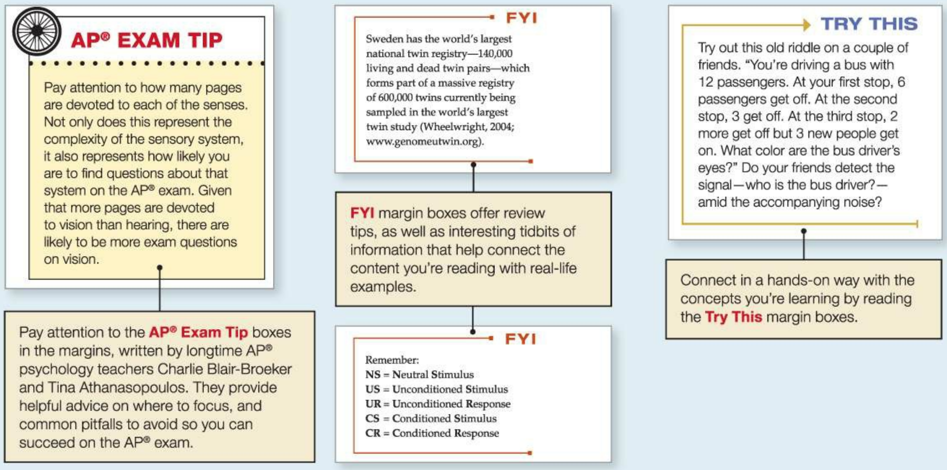
Features



AP® EXAM TIP

Pay attention to how many pages are devoted to each of the senses. Not only does this represent the complexity of the sensory system, it also represents how likely you are to find questions about that system on the AP® exam. Given that more pages are devoted to vision than hearing, there are likely to be more exam questions on vision.

Pay attention to the **AP® Exam Tip** boxes in the margins, written by longtime AP® psychology teachers Charlie Blair-Broeker and Tina Athanasopoulos. They provide helpful advice on where to focus, and common pitfalls to avoid so you can succeed on the AP® exam.

FYI

Sweden has the world's largest national twin registry—140,000 living and dead twin pairs—which forms part of a massive registry of 600,000 twins currently being sampled in the world's largest twin study (Wheelwright, 2004; www.genomeutwin.org).

FYI margin boxes offer review tips, as well as interesting tidbits of information that help connect the content you're reading with real-life examples.

FYI

Remember:
NS = Neutral Stimulus
US = Unconditioned Stimulus
UR = Unconditioned Response
CS = Conditioned Stimulus
CR = Conditioned Response

TRY THIS

Try out this old riddle on a couple of friends. "You're driving a bus with 12 passengers. At your first stop, 6 passengers get off. At the second stop, 3 get off. At the third stop, 2 more get off but 3 new people get on. What color are the bus driver's eyes?" Do your friends detect the signal—who is the bus driver?—amid the accompanying noise?

Connect in a hands-on way with the concepts you're learning by reading the **Try This** margin boxes.

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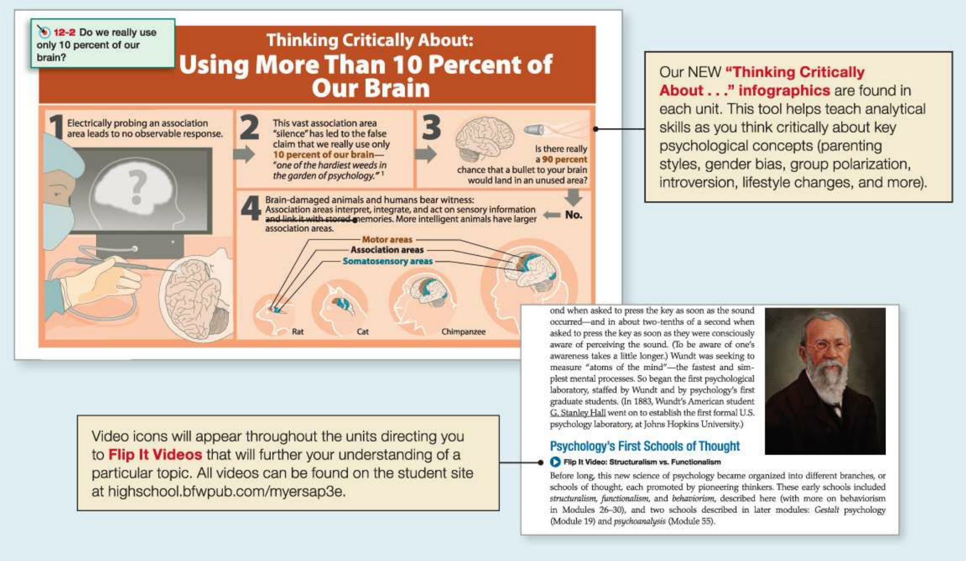

12-2 Do we really use only 10 percent of our brain?

Thinking Critically About:
Using More Than 10 Percent of Our Brain

1 Electrically probing an association area leads to no observable response.
2 This vast association area "silence" has led to the false claim that we really use only 10 percent of our brain—"one of the hardiest weeds in the garden of psychology."1
3 Is there really a 90 percent chance that a bullet to your brain would land in an unused area?
No.
4 Brain-damaged animals and humans bear witness: Association areas interpret, integrate, and act on sensory information ~~and link it with stored~~ memories. More intelligent animals have larger association areas.
Motor areas
Association areas
Somatosensory areas
Rat
Cat
Chimpanzee

Our NEW **"Thinking Critically About . . ." infographics** are found in each unit. This tool helps teach analytical skills as you think critically about key psychological concepts (parenting styles, gender bias, group polarization, introversion, lifestyle changes, and more).

ond when asked to press the key as soon as the sound occurred—and in about two-tenths of a second when asked to press the key as soon as they were consciously aware of perceiving the sound. (To be aware of one's awareness takes a little longer.) Wundt was seeking to measure "atoms of the mind"—the fastest and simplest mental processes. So began the first psychological laboratory, staffed by Wundt and by psychology's first graduate students. (In 1883, Wundt's American student G. Stanley Hall went on to establish the first formal U.S. psychology laboratory, at Johns Hopkins University.)

Psychology's First Schools of Thought

Flip It Video: Structuralism vs. Functionalism

Before long, this new science of psychology became organized into different branches, or schools of thought, each promoted by pioneering thinkers. These early schools included *structuralism, functionalism,* and *behaviorism,* described here (with more on behaviorism in Modules 26–30), and two schools described in later modules: *Gestalt* psychology (Module 19) and *psychoanalysis* (Module 55).

Video icons will appear throughout the units directing you to **Flip It Videos** that will further your understanding of a particular topic. All videos can be found on the student site at highschool.bfwpub.com/myersap3e.

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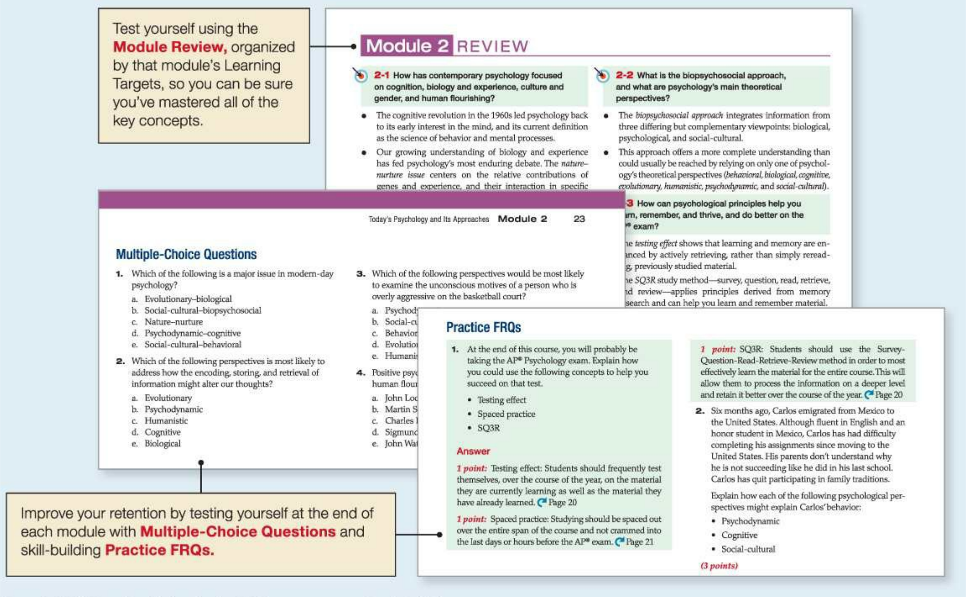
Each module concludes with a review.



Test yourself using the **Module Review,** organized by that module's Learning Targets, so you can be sure you've mastered all of the key concepts.

Module 2 REVIEW

2-1 How has contemporary psychology focused on cognition, biology and experience, culture and gender, and human flourishing?

- The cognitive revolution in the 1960s led psychology back to its early interest in the mind, and its current definition as the science of behavior and mental processes.
- Our growing understanding of biology and experience has fed psychology's most enduring debate. The *nature–nurture issue* centers on the relative contributions of genes and experience, and their interaction in specific

2-2 What is the biopsychosocial approach, and what are psychology's main theoretical perspectives?

- The *biopsychosocial approach* integrates information from three differing but complementary viewpoints: biological, psychological, and social-cultural.
- This approach offers a more complete understanding than could usually be reached by relying on only one of psychology's theoretical perspectives (*behavioral, biological, cognitive, evolutionary, humanistic, psychodynamic,* and *social-cultural*).

3 How can psychological principles help you rn, remember, and thrive, and do better on the ® exam?

e *testing effect* shows that learning and memory are enanced by actively retrieving, rather than simply rereadg, previously studied material.

e *SQ3R* study method—survey, question, read, retrieve, d review—applies principles derived from memory search and can help you learn and remember material.

Today's Psychology and Its Approaches **Module 2** 23

Multiple-Choice Questions

1. Which of the following is a major issue in modern-day psychology?
   a. Evolutionary–biological
   b. Social-cultural–biopsychosocial
   c. Nature–nurture
   d. Psychodynamic–cognitive
   e. Social-cultural–behavioral
2. Which of the following perspectives is most likely to address how the encoding, storing, and retrieval of information might alter our thoughts?
   a. Evolutionary
   b. Psychodynamic
   c. Humanistic
   d. Cognitive
   e. Biological
3. Which of the following perspectives would be most likely to examine the unconscious motives of a person who is overly aggressive on the basketball court?
   a. Psychod
   b. Social-cu
   c. Behavior
   d. Evolutio
   e. Humanis
4. Positive psy human flour
   a. John Loc
   b. Martin S
   c. Charles
   d. Sigmund
   e. John Wat

Practice FRQs

1. At the end of this course, you will probably be taking the AP® Psychology exam. Explain how you could use the following concepts to help you succeed on that test.
   - Testing effect
   - Spaced practice
   - SQ3R

Answer

1 point: Testing effect: Students should frequently test themselves, over the course of the year, on the material they are currently learning as well as the material they have already learned. Page 20

1 point: Spaced practice: Studying should be spaced out over the entire span of the course and not crammed into the last days or hours before the AP® exam. Page 21

1 point: SQ3R: Students should use the Survey-Question-Read-Retrieve-Review method in order to most effectively learn the material for the entire course. This will allow them to process the information on a deeper level and retain it better over the course of the year. Page 20

2. Six months ago, Carlos emigrated from Mexico to the United States. Although fluent in English and an honor student in Mexico, Carlos has had difficulty completing his assignments since moving to the United States. His parents don't understand why he is not succeeding like he did in his last school. Carlos has quit participating in family traditions.

   Explain how each of the following psychological perspectives might explain Carlos' behavior:
   - Psychodynamic
   - Cognitive
   - Social-cultural

   (3 points)

Improve your retention by testing yourself at the end of each module with **Multiple-Choice Questions** and skill-building **Practice FRQs.**

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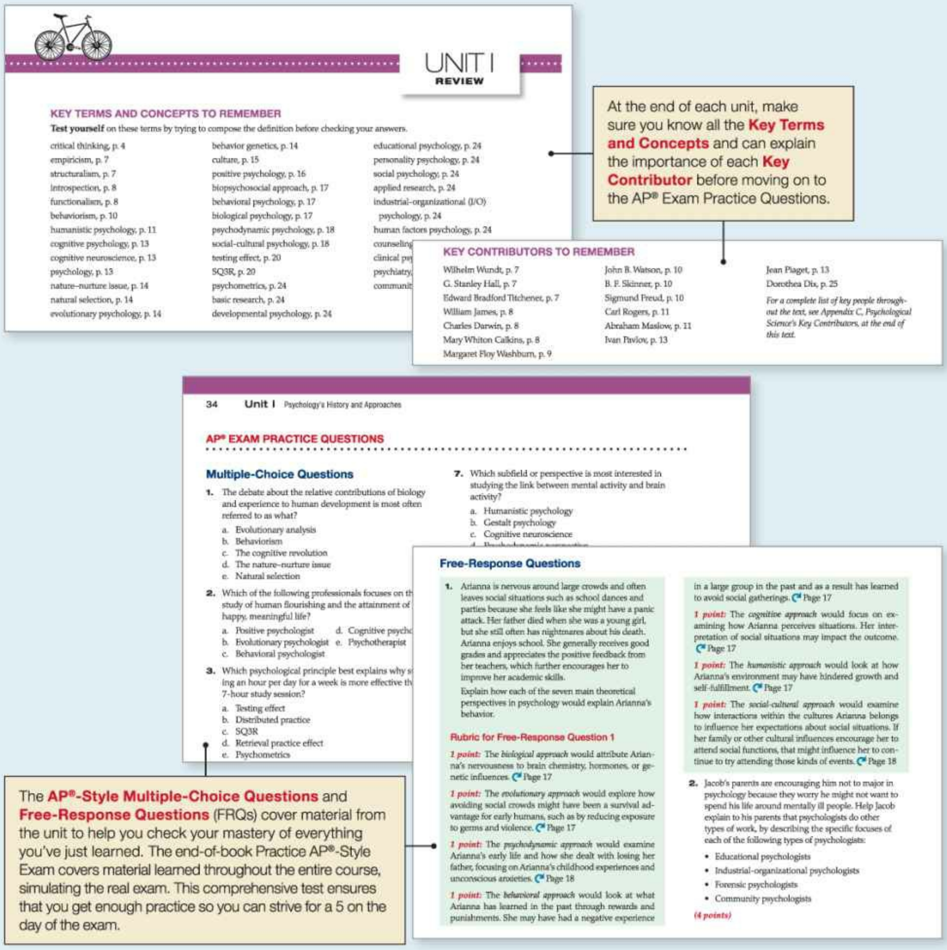
Each unit ends with a comprehensive AP®-style review.



UNIT I
REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

Test yourself on these terms by trying to compose the definition before checking your answers.

critical thinking, p. 4
empiricism, p. 7
structuralism, p. 7
introspection, p. 8
functionalism, p. 8
behaviorism, p. 10
humanistic psychology, p. 11
cognitive psychology, p. 13
cognitive neuroscience, p. 13
psychology, p. 13
nature–nurture issue, p. 14
natural selection, p. 14
evolutionary psychology, p. 14

behavior genetics, p. 14
culture, p. 15
positive psychology, p. 16
biopsychosocial approach, p. 17
behavioral psychology, p. 17
biological psychology, p. 17
psychodynamic psychology, p. 18
social-cultural psychology, p. 18
testing effect, p. 20
SQ3R, p. 20
psychometrics, p. 24
basic research, p. 24
developmental psychology, p. 24

educational psychology, p. 24
personality psychology, p. 24
social psychology, p. 24
applied research, p. 24
industrial-organizational (I/O)
psychology, p. 24
human factors psychology, p. 24
counseling
clinical p
psychiatry,
communit

At the end of each unit, make sure you know all the **Key Terms and Concepts** and can explain the importance of each **Key Contributor** before moving on to the AP® Exam Practice Questions.

KEY CONTRIBUTORS TO REMEMBER

Wilhelm Wundt, p. 7
G. Stanley Hall, p. 7
Edward Bradford Titchener, p. 7
William James, p. 8
Charles Darwin, p. 8
Mary Whiton Calkins, p. 8
Margaret Floy Washburn, p. 9

John B. Watson, p. 10
B. F. Skinner, p. 10
Sigmund Freud, p. 10
Carl Rogers, p. 11
Abraham Maslow, p. 11
Ivan Pavlov, p. 13

Jean Piaget, p. 13
Dorothea Dix, p. 25

For a complete list of key people throughout the text, see Appendix C, Psychological Science's Key Contributors, at the end of this text.

34 **Unit I** Psychology's History and Approaches

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. The debate about the relative contributions of biology and experience to human development is most often referred to as what?
   a. Evolutionary analysis
   b. Behaviorism
   c. The cognitive revolution
   d. The nature–nurture issue
   e. Natural selection

2. Which of the following professionals focuses on th study of human flourishing and the attainment of happy, meaningful life?
   a. Positive psychologist
   b. Evolutionary psychologist
   c. Behavioral psychologist
   d. Cognitive psych
   e. Psychotherapist

3. Which psychological principle best explains why s ing an hour per day for a week is more effective th 7-hour study session?
   a. Testing effect
   b. Distributed practice
   c. SQ3R
   d. Retrieval practice effect
   e. Psychometrics

7. Which subfield or perspective is most interested in studying the link between mental activity and brain activity?
   a. Humanistic psychology
   b. Gestalt psychology
   c. Cognitive neuroscience

The **AP®-Style Multiple-Choice Questions** and **Free-Response Questions** (FRQs) cover material from the unit to help you check your mastery of everything you've just learned. The end-of-book Practice AP®-Style Exam covers material learned throughout the entire course, simulating the real exam. This comprehensive test ensures that you get enough practice so you can strive for a 5 on the day of the exam.

Free-Response Questions

1. Arianna is nervous around large crowds and often leaves social situations such as school dances and parties because she feels like she might have a panic attack. Her father died when she was a young girl, but she still often has nightmares about his death. Arianna enjoys school. She generally receives good grades and appreciates the positive feedback from her teachers, which further encourages her to improve her academic skills.

   Explain how each of the seven main theoretical perspectives in psychology would explain Arianna's behavior.

Rubric for Free-Response Question 1

1 point: The *biological approach* would attribute Arianna's nervousness to brain chemistry, hormones, or genetic influences. Page 17

1 point: The *evolutionary approach* would explore how avoiding social crowds might have been a survival advantage for early humans, such as by reducing exposure to germs and violence. Page 17

1 point: The *psychodynamic approach* would examine Arianna's early life and how she dealt with losing her father, focusing on Arianna's childhood experiences and unconscious anxieties. Page 18

1 point: The *behavioral approach* would look at what Arianna has learned in the past through rewards and punishments. She may have had a negative experience in a large group in the past and as a result has learned to avoid social gatherings. Page 17

1 point: The *cognitive approach* would focus on examining how Arianna perceives situations. Her interpretation of social situations may impact the outcome. Page 17

1 point: The *humanistic approach* would look at how Arianna's environment may have hindered growth and self-fulfillment. Page 17

1 point: The *social-cultural approach* would examine how interactions within the cultures Arianna belongs to influence her expectations about social situations. If her family or other cultural influences encourage her to attend social functions, that might influence her to continue to try attending those kinds of events. Page 18

2. Jacob's parents are encouraging him not to major in psychology because they worry he might not want to spend his life around mentally ill people. Help Jacob explain to his parents that psychologists do other types of work, by describing the specific focuses of each of the following types of psychologists:
   - Educational psychologists
   - Industrial-organizational psychologists
   - Forensic psychologists
   - Community psychologists

(4 points)

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Enrichment Modules

Learning about psychology doesn't stop after you take the exam in May. Continue your exploration with Enrichment Modules 81–83 to help round out your course and prepare you for further psychology study in college and beyond.

For Teachers

Please visit our catalog page (**highschool.bfwpub.com/myersap3e**) or see the Teacher's Edition for more information.

Teacher's Edition (*Elizabeth Yost Hammer, Xavier University of Louisiana*)

Teacher’s Resource Materials (handouts, PD videos, and extra help for teachers)
TE-Book (e-Book version of the Teacher’s Edition with integrated supplements)
ExamView® Assessment Suite Test Bank
Teacher’s Resource Flash Drive
Lecture Slides

* * *

What an amazing success story AP® psychology has become since 1992, when 3916 students took the first exam. In 2017, 303,000 students sat for the AP® psychology exam! It has been an honor for us to support the teaching of our humanly significant discipline to so many of those students, and a great pleasure to have met or corresponded with so many AP® teachers and their students. It is also a keenly felt responsibility. So, please do feel free to be in touch with your feedback and suggestions.

With every good wish,

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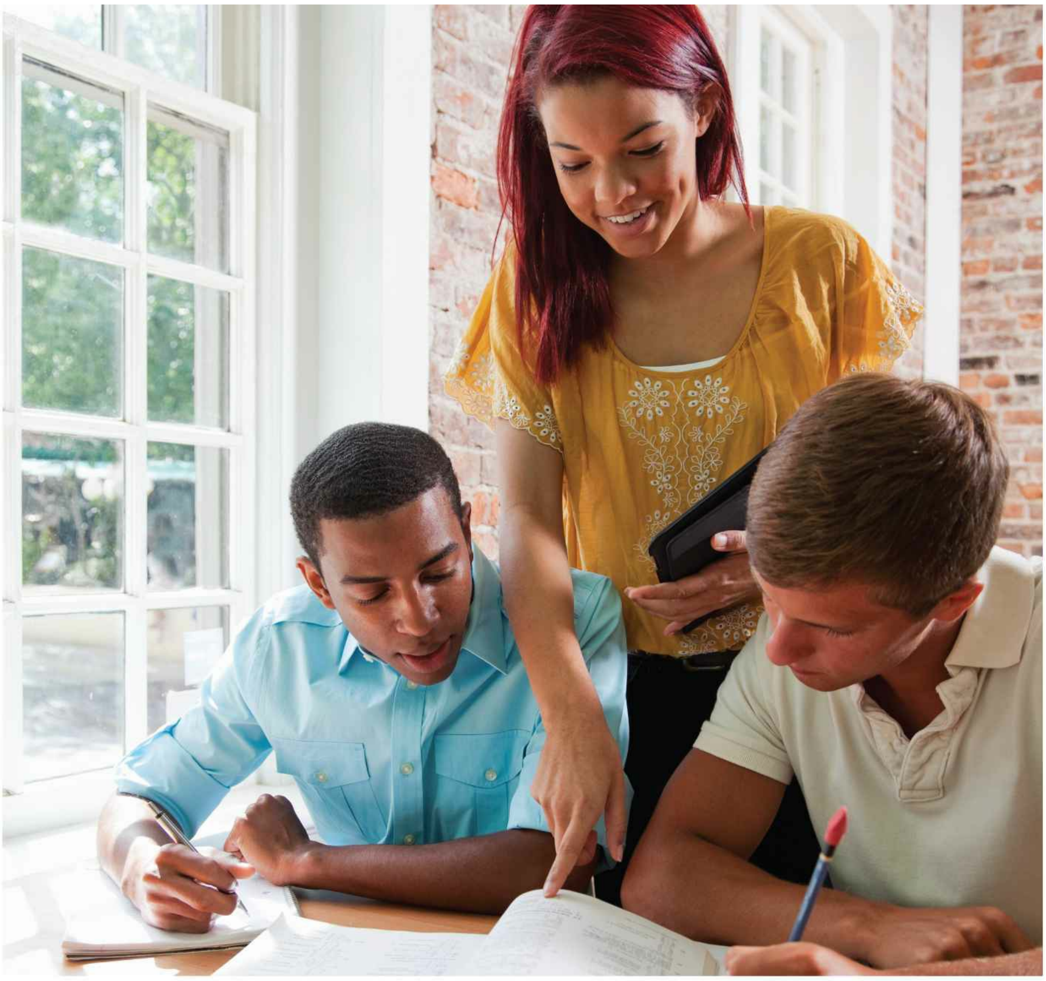
UNIT I Psychology’s History and Approaches



kali9/Getty Images

MODULES

1 Psychology and Its History

2 Today’s Psychology and Its Approaches

3 Subfields in Psychology

From news and popular media portrayals, you might think that psychologists analyze personality, offer counseling, dispense child-raising advice, examine crime scenes, and testify in court. Do they?

Yes, and much more. Consider some of psychology’s questions that you may wonder about:

- Have you ever found yourself reacting to something as one of your biological parents would—perhaps in a way you vowed you never would—and then wondered how much of your personality you inherited? *To what extent do genes predispose our individual differences in personality? How do home and community environments shape us?*
- Have you ever worried about how to act among people of a different culture, race, gender identity, or sexual orientation? *In what ways are we alike as members of the human family? How do we differ?*
- Have you ever awakened from a nightmare and wondered why you had such a crazy dream? *Why do we dream?*
- Have you ever played peekaboo with a 6-month-old and wondered why the baby finds your disappearing/reappearing act so delightful? *What do babies actually perceive and think?*
- Have you ever wondered what enables school and work success? *Does inborn intelligence explain why some people get richer, think more creatively, or relate more sensitively? Or does gritty effort, and a belief that we can grow smarter, matter more?*
- Have you ever become depressed or anxious and wondered whether you’ll ever feel “normal”? *What triggers our bad moods—and our good ones? What’s the line between a normal mood swing and a psychological disorder?*

Psychology is a science that seeks to answer such questions about us all—how and why we think, feel, and act as we do.

Unit I Overview Video

Module **1 Psychology and Its History**

LEARNING TARGETS

- 1–1 Explain how psychology is a science and why the “rat is always right.”
- 1–2 Describe the three key elements of the scientific attitude and how they support scientific inquiry.
- 1–3 Explain how critical thinking feeds a scientific attitude, and smarter thinking for everyday life.
- 1–4 Describe how psychology developed from early understandings of mind and body to the beginnings of modern science.
- 1–5 Describe some important milestones in psychology’s early development.
- 1–6 Explain how behaviorism, Freudian psychology, and humanistic psychology furthered the development of psychological science.

Once upon a time, on a planet in our neighborhood of the universe, there came to be people. Soon thereafter, these creatures became intensely interested in themselves and in one another: “Who are we? What produces our thoughts? Our feelings? Our actions? And how are we to understand and manage those around us?”

Left: Sergey Furtaev/Shutterstock, Middle: Ariadne Van Zandbergen/Alamy, Right: Jim Craigmyle/Getty Images

A smile is a smile the world around The science of psychology builds from the input of multiple disciplines in many lands. As you will see throughout this book, we’ve come to learn not only of our cultural and gender diversity but also of the similarities that define our shared human nature. People in different cultures vary in when and how often they smile, for example, but a naturally happy smile *means* the same thing anywhere in the world.

Psychology Is a Science

1-1 How is psychology a science, and why is it the "rat is always right"?

Underlying all science is, first, a passion to explore and understand without misleading or being misled. Some questions *(Is there life after death?)* are beyond science. Answering them in any way requires a leap of faith. With many other ideas *(Can some people demonstrate ESP?)*, the proof is in the pudding. Let the facts speak for themselves.

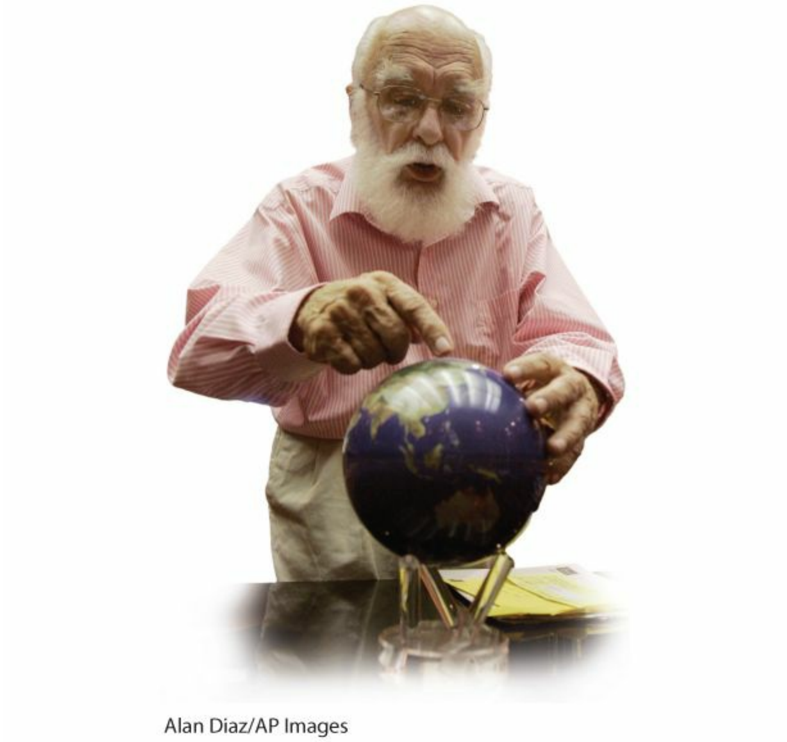
AP® EXAM TIP

To assist your active learning of psychology, Learning Targets are grouped together at the start of each module and then framed as questions that appear at the beginning of the pertinent section of reading. It helps to keep the question in mind as you read through a section to make sure that you are following the main point of the discussion.

Magician James Randi has used a scientific *approach* when testing those claiming to see glowing auras around people's bodies:

> **Randi:** Do you see an aura around my head?
>
> **Aura seer:** Yes, indeed.
>
> **Randi:** Can you still see the aura if I put this magazine in front of my face?
>
> **Aura seer:** Of course.
>
> **Randi:** Then if I were to step behind a wall barely taller than I am, you could determine my location from the aura visible above my head, right?

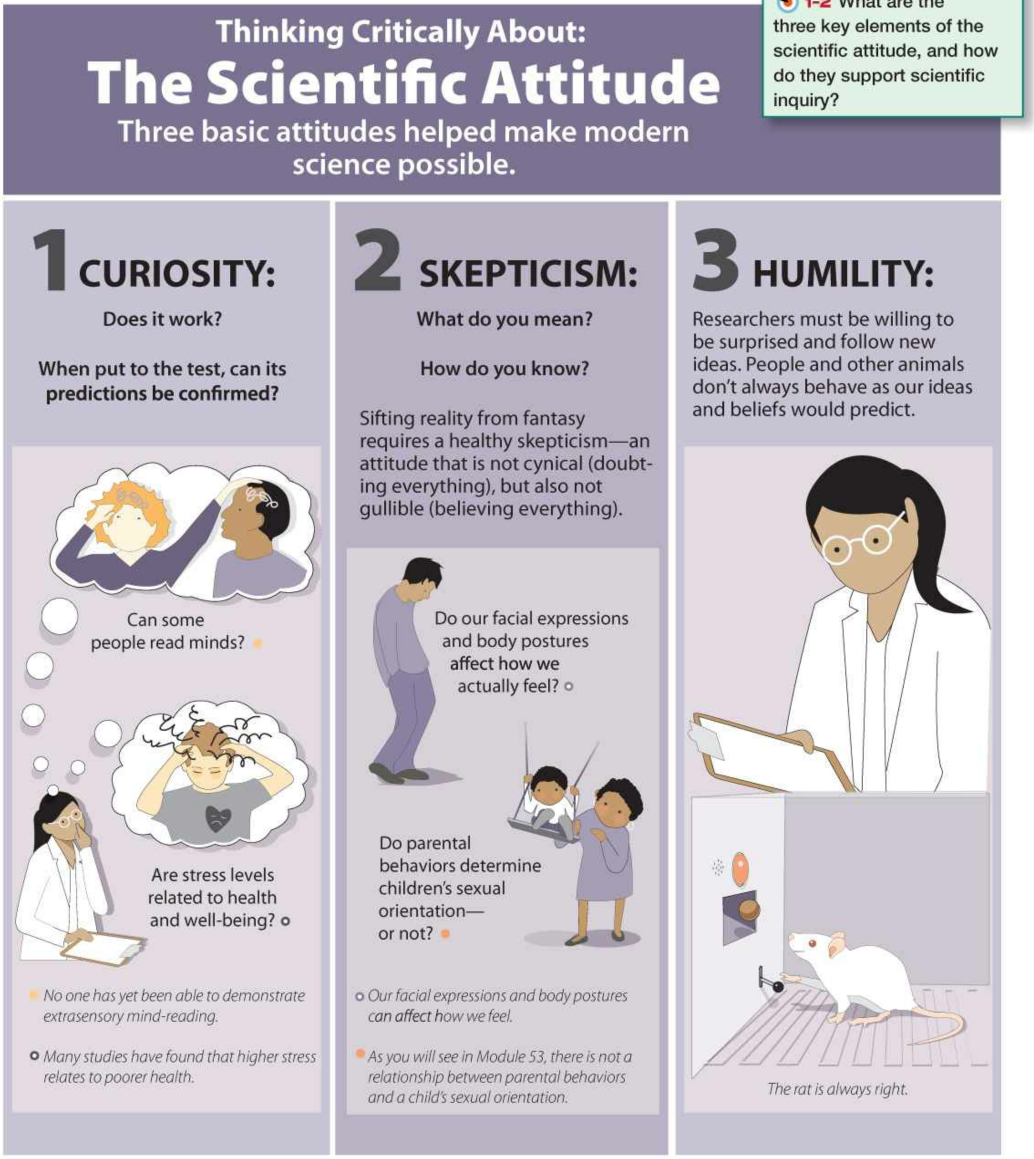
Randi once told me [DM] that no aura seer had agreed to take this simple test.



Alan Diaz/AP Images

The Amazing Randi The magician James Randi exemplifies skepticism. He has tested and debunked supposed psychic phenomena.

1-2 What are the three key elements of the scientific attitude, and how do they support scientific inquiry?



Thinking Critically About:

The Scientific Attitude

Three basic attitudes helped make modern science possible.

1 CURIOSITY:

Does it work?

When put to the test, can its predictions be confirmed?

Can some people read minds?

Are stress levels related to health and well-being?

No one has yet been able to demonstrate extrasensory mind-reading.

Many studies have found that higher stress relates to poorer health.

2 SKEPTICISM:

What do you mean?

How do you know?

Sifting reality from fantasy requires a healthy skepticism—an attitude that is not cynical (doubting everything), but also not gullible (believing everything).

Do our facial expressions and body postures affect how we actually feel?

Do parental behaviors determine children's sexual orientation—or not?

Our facial expressions and body postures can affect how we feel.

As you will see in Module 53, there is not a relationship between parental behaviors and a child's sexual orientation.

3 HUMILITY:

Researchers must be willing to be surprised and follow new ideas. People and other animals don't always behave as our ideas and beliefs would predict.

The rat is always right.

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No matter how sensible-seeming or how wild an idea, the smart thinker asks: *Does it work?* When put to the test, do the data support its predictions? Subjected to such scrutiny, crazy-sounding ideas sometimes find support. During the 1700s, scientists scoffed at the notion that meteorites had extraterrestrial origins. When two Yale scientists challenged the conventional opinion, Thomas Jefferson reportedly jeered, “Gentlemen, I would rather believe that those two Yankee professors would lie than to believe that stones fell from Heaven.” Sometimes scientific inquiry turns jeers into cheers.

More often, science becomes society’s garbage disposal, sending crazy-sounding ideas to the waste heap, atop previous claims of perpetual motion machines, miracle cancer cures, and out-of-body travels into centuries past. To sift reality from fantasy, sense from nonsense, verified facts from fake news, therefore requires a scientific attitude: being skeptical but not cynical, open but not gullible. When ideas compete, careful testing can reveal which ones best match the facts. Can astrologers predict your future based on the planets' position at your birth? Is electroconvulsive therapy (delivering an electric shock to the brain) an effective treatment for severe depression? As we will see, putting such claims to the test has led psychological scientists to answer *No* to the first question and *Yes* to the second.

Putting a scientific attitude into practice requires not only curiosity and skepticism but also humility—an awareness of our own vulnerability to error and an openness to new perspectives. What matters is not my opinion or yours, but the truths revealed by our questioning and testing. If people or other animals don't behave as our ideas predict, then so much the worse for our ideas. This humble attitude was expressed in one of psychology's early mottos: "The rat is always right." (See Thinking Critically About: The Scientific Attitude.)

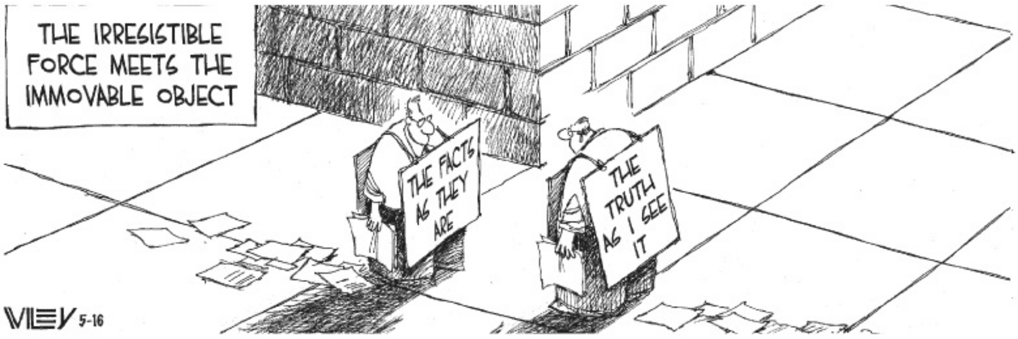
Critical Thinking

1-3 How does critical thinking feed a scientific attitude, and smarter thinking for everyday life?

The scientific attitude—curiosity + skepticism + humility—prepares us to think harder and smarter. This thinking style, called **critical thinking**, examines assumptions, appraises the source, discerns hidden biases, evaluates evidence, and assesses conclusions. Whether reading a research report or an online opinion, or listening to news or a talk show, critical thinkers ask questions: *How do they know that? What is this person's agenda? Is the conclusion based on anecdote, or on evidence? Does the evidence justify a cause-effect conclusion? What alternative explanations are possible?*

critical thinking

thinking that does not blindly accept arguments and conclusions. Rather, it examines assumptions, appraises the source, discerns hidden biases, evaluates evidence, and assesses conclusions.


THE IRRESISTIBLE FORCE MEETS THE IMMOVABLE OBJECT
THE FACTS AS THEY ARE
THE TRUTH AS I SEE IT
WILEY 5-16

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Critical thinkers wince when people make factual claims based on gut intuition: "I *feel like* climate change is [or isn't] happening." "I *feel like* self-driving cars are more [or less] dangerous." "I *feel like* my candidate is more honest." Such beliefs (commonly mislabeled as feelings) may or may not be true. Critical thinkers are open to the possibility that they might be wrong. Sometimes, they know, the best evidence confirms their intuitions. Sometimes it challenges them and beckons them to a different way of thinking.

FYI

Throughout the text, important concepts are **boldfaced,** and important people are underlined. As you study, you can find the key terms with their definitions in a nearby margin and in the Glossary/Glosario at the book's end. (In the e-book, definitions are always a click away.) You will find a list of each unit's key contributors in the Unit Review and in Appendix C, Psychological Science's Key Contributors, at the back of the book.

Critical thinking, informed by science, helps clear the colored lenses of our biases. Consider: Does climate change threaten our future, and, if so, is it human-caused? In 2016, climate-action advocates interpreted record Louisiana flooding as evidence of climate change. In 2015, climate-change skeptics perceived North American bitter winter cold as discounting global warming. Rather than having their understanding of climate change swayed by recent weather, critical thinkers say, "Show me the evidence." Over time, is the Earth actually warming? Are the polar ice caps melting? Are vegetation patterns changing? And is human activity emitting atmospheric CO_2 that would lead us to expect such changes?

When contemplating such issues, critical thinkers will also consider the credibility of sources. They will also look at the evidence *(Do the facts support them, or are they just makin' stuff up?).* They will recognize multiple perspectives. And they will expose themselves to news sources that challenge their preconceived ideas.

From a tongue-in-cheek Twitter feed:

> “*The problem with quotes on the Internet is that you never know if they're true.*”
>
> *Abraham Lincoln*

Some religious people may view critical thinking and scientific inquiry, including psychology's, as a threat. Yet many of the leaders of the scientific revolution, including Copernicus and Newton, were deeply religious people acting on the idea that "in order to love and honor God, it is necessary to fully appreciate the wonders of his handiwork" (Stark, 2003a,b)

Critical thinking can lead us to surprising findings. Some examples from psychological science: Massive losses of brain tissue early in life may have minimal long-term effects (see Module 12). Within days, newborns can recognize their mother by her odor (see Module 45). After brain damage, a person may be able to learn new skills yet be unaware of such learning (see Modules 31–33). Diverse groups—men and women, old and young, rich and middle class, those with and without disabilities—report roughly comparable levels of personal happiness (see Module 83).

> “*My deeply held belief is that if a god anything like the traditional sort exists, our curiosity and intelligence are provided by such a god. We would be unappreciative of those gifts . . . if we suppressed our passion to explore the universe and ourselves.*”
>
> *Carl Sagan,* Broca's Brain, *1979*

As later modules illustrate, critical inquiry sometimes also debunks popular presumptions. Sleepwalkers are *not* acting out their dreams (see Module 24). Our past experiences are *not* all recorded verbatim in our brains; with brain stimulation or hypnosis, one *cannot* simply replay and relive long-buried or repressed memories (see Module 33). Most people do *not* suffer from unrealistically low self-esteem, and high self-esteem is *not* all good (see Module 59). Opposites tend *not* to attract (see Module 79). In these instances and many others, what psychological scientists have learned is not what is widely believed.

Left: Paul Sakuma/AP Images, Right: Photos 12/Alamy

Life after studying psychology The study of psychology and its critical thinking strategies have helped prepare people for varied occupations, as illustrated by Facebook founder Mark Zuckerberg (who studied psychology and computer science while at Harvard) and Natalie Portman (who majored in psychology and co-authored a scientific article at Harvard—and on one of her summer breaks was filmed for *Star Wars: Episode I*).

Psychology's critical inquiry can also identify effective policies. To deter crime, should we invest money in lengthening prison sentences, or increase the likelihood of arrest? To help people recover from a trauma, should counselors help them relive it, or not? To increase voting, should we tell people about the low turnout problem, or emphasize that their peers are voting? What matters is not what we "feel" is true, but what *is* true. When put to critical thinking's test—and contrary to common practice—the second option in each of this paragraph's examples wins (Shafir, 2013).

FYI

Information sources are cited in parentheses, with name and date. Every citation can be found in the end-of-book References, with complete documentation that follows American Psychological Association (APA) style.

✓ Check Your Understanding

Ask Yourself

- Were you surprised to learn that psychology is a science? How would you defend that point if someone else now asked you about this?

Test Yourself

- Describe what’s involved in critical thinking.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Prescientific Psychology

1-4 How did psychology develop from early understandings of mind and body to the beginnings of modern science?

To be human is to be curious about ourselves and the world around us. We can trace many of psychology’s current questions back to historic *philosophical* and *physiological* approaches. These early thinkers wondered: How does our mind work? How does our body relate to our mind? How much of what we know comes built in? How much is acquired through experience?

AP® EXAM TIP

Memory research reveals a *testing effect:* We retain information much better if we actively retrieve it by self-testing and rehearsing. (More on this in Module 2.) To bolster your learning and memory, take advantage of the self-testing opportunities you will find throughout this text. These Check Your Understanding sections will appear periodically throughout each module. The *Ask Yourself* questions will help you relate the material to your life (making it more memorable). You can check your answers to the *Test Yourself* review questions in Appendix E. (In the e-book, answers are a click away.)

In ancient Greece, the philosopher-teacher Socrates (469–399 B.C.E.) and his student Plato (428–348 B.C.E.) concluded that mind is separable from body and continues after the body dies, and that knowledge is innate—born within us. Unlike Socrates and Plato, who derived principles by logic, Plato’s student Aristotle (384–322 B.C.E.) loved data. An intellectual ancestor of today’s scientists, Aristotle derived principles from careful observations. Moreover, he said knowledge is *not* preexisting (sorry, Socrates and Plato); instead it grows from the experiences stored in our memories.

The next 2000 years brought few enduring new insights into human nature, but that changed in the 1600s, when modern science began to flourish. With it came new theories of human behavior and new versions of the ancient debates. A frail but brilliant Frenchman named René Descartes [day-CART] (1595–1650) agreed with Socrates and Plato about the existence of innate ideas and mind's being "entirely distinct from body" and able to survive its death. Descartes' concept of mind forced him to wonder, as people have ever since, how the immaterial mind and physical body communicate. A scientist as well as a philosopher, Descartes dissected animals and concluded that the fluid in the brain's cavities contained "animal spirits." These spirits, he surmised, flowed from the brain through what we call the nerves (which he thought were hollow) to the muscles, provoking movement. Memories formed as experiences opened pores in the brain into which the animal spirits also flowed.

Descartes was right that nerve paths are important and that they enable reflexes. Yet, genius though he was, and standing upon the knowledge accumulated from 99+ percent of our human history, he hardly had a clue of what today's average 12-year-old knows. Indeed, most of the scientific story of our self-exploration—the story told in this book—has been written in but the last historical eye-blink of human time.

> “*If I see further, it is by standing on the shoulders of giants.*”
>
> *Isaac Newton, writing to a friend in 1676*

Meanwhile, across the English Channel in Britain, science was taking a more down-to-earth form, centered on experiment, experience, and commonsense judgment. Francis Bacon (1561–1626) became one of the founders of modern science, and his influence lingers in the experiments of today's psychological science. Bacon also was fascinated by the human mind and its failings. Anticipating what we have come to appreciate about our mind's hunger to perceive patterns even in random events, he wrote that "the human understanding, from its peculiar nature, easily supposes a greater degree of order and equality in things than it really finds" (*Novum*

Organuum, 1620).

Some 50 years after Bacon’s death, John Locke (1632–1704), a British political philosopher, sat down to write a one-page essay on “our own abilities” for an upcoming discussion with friends. After 20 years and hundreds of pages, Locke had completed one of history’s greatest late papers (*An Essay Concerning Human Understanding*). In it he famously argued that the mind at birth is a *tabula rasa*—a “blank slate”—on which experience writes. This idea, adding to Bacon’s ideas, helped form modern **empiricism,** the idea that what we know comes from experience, and that observation and experimentation enable scientific knowledge.

empiricism

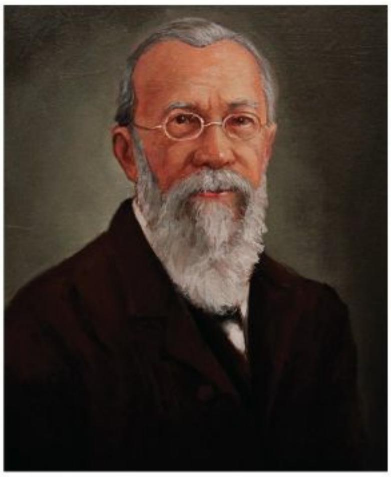
the idea that knowledge comes from experience, and that observation and experimentation enable scientific knowledge.

Psychological Science Is Born

1-5 What were some important milestones in psychology's early development?

Psychology's First Laboratory

Philosophers' thinking about thinking continued until the birth of psychology as we know it. That happened on a December day in 1879, in a small, third-floor room at Germany's University of Leipzig. There, two young men were helping an austere, middle-aged professor, Wilhelm Wundt, create an experimental apparatus. Their machine measured how long it took for people to press a telegraph key after hearing a ball hit a platform (Hunt, 1993). Curiously, people responded in about one-tenth of a second when asked to press the key as soon as the sound occurred—and in about two-tenths of a second when asked to press the key as soon as they were consciously aware of perceiving the sound. (To be aware of one's awareness takes a little longer.) Wundt was seeking to measure "atoms of the mind"—the fastest and simplest mental processes. So began the first psychological laboratory, staffed by Wundt and by psychology's first graduate students. (In 1883, Wundt's American student G. Stanley Hall went on to establish the first formal U.S. psychology laboratory, at Johns Hopkins University.)



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Wilhelm Wundt (1832–1920) Wundt established the first psychology laboratory at the University of Leipzig, Germany.

AP® EXAM TIP

Every question on the AP® Psychology exam will reflect the fact that psychology is a science built on the tradition of Wundt and his laboratory. Correct test answers are based on what research has revealed, not on “common sense”!

Psychology’s First Schools of Thought

Flip it Video: structuralism vs. Functionalism

Before long, this new science of psychology became organized into different branches, or schools of thought, each promoted by pioneering thinkers. These early schools included *structuralism*, *functionalism*, and *behaviorism*, described here (with more on behaviorism in Modules 26–30), and two schools described in later modules: *Gestalt* psychology (Module 19) and *psychoanalysis* (Module 55).

Structuralism

Soon after receiving his Ph.D. in 1892, Wundt’s student Edward Bradford Titchener joined the Cornell University faculty and introduced **structuralism.** Much as chemists developed the periodic table to classify chemical elements, Titchener aimed to classify and understand elements of the mind’s structure. He engaged people in self-reflective **introspection** (looking inward), training them to report elements of their experience as they looked at a rose, listened to a metronome, smelled a scent, or tasted a substance. What were their immediate sensations, their images, their feelings? And how did these relate to one another? Alas, structuralism’s technique of introspection proved somewhat unreliable. It required smart, verbal people, and its results varied from person to person and experience to experience. Moreover, we often just don’t know why we feel what we feel and do what we do. Research suggests that people’s recollections frequently err. So do their self-reports about what, for example, has caused them to help or hurt another (Myers, 2002). As introspection waned, so did structuralism.

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Edward Bradford Titchener (1867–1927) Titchener used introspection to search for the mind's structural elements.

structuralism

an early school of thought promoted by Wundt and Titchener; used introspection to reveal the structure of the human mind.

introspection

the process of looking inward in an attempt to directly observe one's own psychological processes.

Functionalism

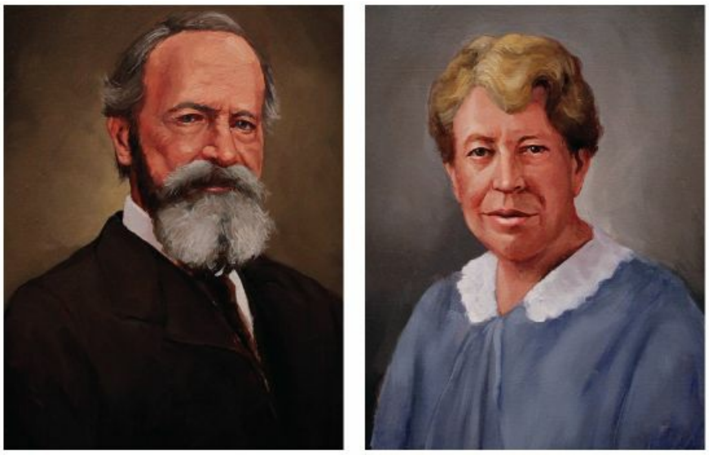
Hoping to assemble the mind's structure from simple elements was rather like trying to understand a car by examining its disconnected parts. Philosopher-psychologist William James thought it would be more fruitful to consider the evolved functions of our thoughts and feelings. Smelling is what the nose does; thinking is what the brain does. But *why* do the nose and brain do these things? Under the influence of evolutionary theorist Charles Darwin, James assumed that thinking, like smelling, developed because it was *adaptive*—it helped our ancestors survive and reproduce.

Consciousness serves a function. It enables us to consider our past, adjust to our present, and plan our future. As a **functionalist,** James studied down-to-earth emotions, memories, willpower, habits, and moment-to-moment streams of consciousness.

functionalism

an early school of thought promoted by James and influenced by Darwin; explored how mental and behavioral processes function—how they enable the organism to adapt, survive, and flourish.

James' greatest legacy, however, came less from his laboratory than from his Harvard teaching and his writing. When not plagued by ill health and depression, James was an impish, outgoing, and joyous man, who once recalled that "the first lecture on psychology I ever heard was the first I ever gave." During one of his wise-cracking lectures, a student interrupted and asked him to get serious (Hunt, 1993). He loved his students, his family, and the world of ideas, but he tired of painstaking chores such as proofreading. "Send me no proofs!" he once told an editor. "I will return them unopened and never speak to you again" (Hunt, 1993, p. 145).



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William James (1842–1910) and Mary Whiton Calkins (1863–1930)

James was a legendary teacher-writer who authored an important 1890 psychology text. He mentored Calkins, who became a pioneering memory researcher and the first woman to be president of the American Psychological

Association.

James' writings moved the publisher Henry Holt to offer James a contract for a textbook on the new science of psychology. James agreed and began work in 1878, with an apology for requesting two years to finish his writing. The text proved an unexpected chore and actually took him 12 years. (Why are we not surprised?) More than a century later, people still read the resulting *Principles of Psychology* (1890) and marvel at the brilliance and elegance with which James introduced psychology to the educated public.

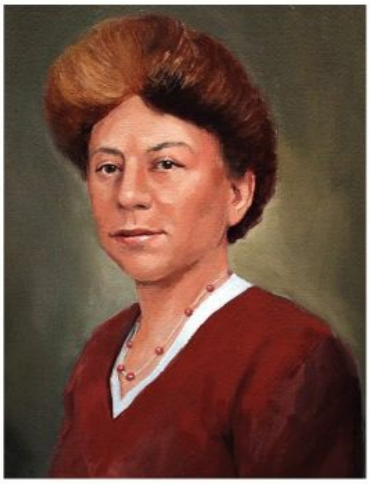
Psychology's First Women

James' legacy stems from his Harvard mentoring as well as from his writing. In 1890, thirty years before American women had the right to vote, he admitted Mary Whiton Calkins into his graduate seminar—over the objections of Harvard's president (Scarborough & Furumoto, 1987). When Calkins joined, the other students (all men) dropped out. So James tutored her alone. Later, she finished all of Harvard's Ph.D. requirements, outscoring all the male students on the qualifying exams. Alas, Harvard denied her the degree she had earned, offering her instead a degree from Radcliffe College, its undergraduate "sister" school for women. Calkins resisted the unequal treatment and refused the degree. She nevertheless went on to become a distinguished memory researcher and in 1905 became the first female president of the American Psychological Association (APA)—a national organization of professional and academic psychologists.

1964 meeting of the Society of Experimental Psychologists in Berkeley, California. Reprinted by permission of the Society of Experimental Psychologists. http://www.sepsych.org/1964.php

Formerly male and pale Over the past half century, psychology has shifted from a mostly white, male discipline to one where women now receive most Ph.D.s. Pioneering female psychologists, such as Inez Beverly Prosser (the first African-American woman to receive a psychology Ph.D., in 1933) and Eleanor Gibson (the only woman in this photo from the 1964 Society of Experimental Psychologists—the group that had barred Margaret Floy Washburn), helped pave the way. In 1971, Kenneth Clark became the APA's first African-American president, and psychology has since then increasingly flourished in diverse communities around the world.

The honor of being the first official female psychology Ph.D. later fell to Margaret Floy Washburn, who also wrote an influential book, *The Animal Mind*, and became the second female APA president in 1921. Her thesis was the first foreign study Wundt published in his psychology journal, but Washburn's gender barred doors for her, too. She could not join the all-male organization of *experimental psychologists* (who explore behavior and thinking with experiments), despite its being founded by Titchener, her own graduate adviser (Johnson, 1997). What a different world from the recent past—1997 to 2017—when women were 10 of the 20 elected presidents of the science-oriented Association for Psychological Science. In the United States, Canada, and Europe, most psychology doctorates are now earned by women.



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Margaret Floy Washburn (1871–1939) The first woman to receive a psychology Ph.D., Washburn synthesized animal behavior research in *The Animal Mind* (1908).

✓ Check Your Understanding

Ask Yourself

- How do you think psychology might change in the future as more women contribute their ideas to the field?

Test Yourself

- What event defined the start of modern scientific psychology?
- Why did introspection fail as a method for understanding how the mind works?
- The school of _______________ used introspection to define the mind's makeup; _______________ focused on how mental processes enable us to adapt, survive, and flourish.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Psychological Science Matures

1–6 How did behaviorism, Freudian psychology, and humanistic psychology further the development of psychological science?

In psychology’s early days, many psychologists shared with the English essayist C. S. Lewis the view that “there is one thing, and only one in the whole universe which we know more about than we could learn from external observation.” That one thing, Lewis said, is ourselves. “We have, so to speak, inside information” (1960, pp. 18–19). Wundt and Titchener focused on inner sensations, images, and feelings. James also engaged in introspective examination of the stream of consciousness and of emotion. For these and other early pioneers, *psychology* was defined as “the science of mental life.”

AP® EXAM TIP

There are lots of important people in psychology. As you study, focus on the significance of their accomplishments. You are more likely to be tested on what a finding means than who discovered it.

Behaviorism

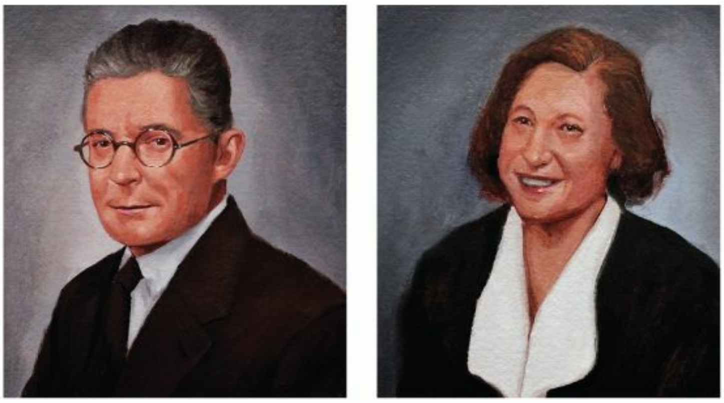
That definition endured until the 1920s, when the first of two provocative American psychologists appeared on the scene. John B. Watson, and later B. F. Skinner, dismissed introspection and redefined *psychology* as “the scientific study of observable behavior.” After all, they said, science is rooted in observation: What you cannot observe and measure, you cannot scientifically study. You cannot observe a sensation, a feeling, or a thought, but you *can* observe and record people’s *behavior* as they are *conditioned*—as they respond to and learn in different situations. Many agreed, and **behaviorism** was one of two major forces in psychology well into the 1960s.

behaviorism

the view that psychology (1) should be an objective science that (2) studies behavior without reference to mental processes. Most psychologists today agree with (1) but not with (2).

Freudian (Psychoanalytic) Psychology

The other major force was Sigmund Freud*'s psychoanalytic psychology*, which emphasized the ways our unconscious mind and childhood experiences affect our behavior. (In later modules, we'll look more closely at Freud's teachings, including his theory of personality and his views on unconscious sexual conflicts and the mind's defenses against its own wishes and impulses.)



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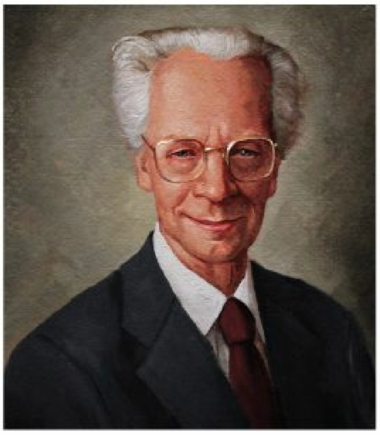
John B. Watson (1878–1958) and Rosalie Rayner (1898–1935)

Working with Rayner, Watson championed psychology as the scientific study of behavior. In a controversial study on a baby who became famous as "Little Albert," he and Rayner showed that fear could be learned. (More about this in Module 26.)



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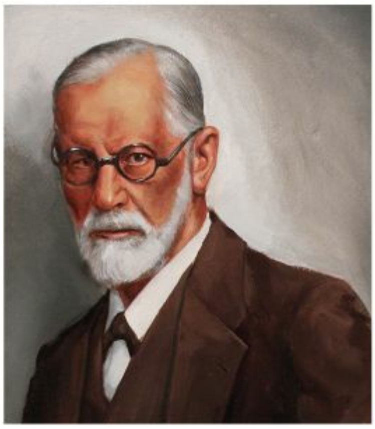
B. F. Skinner (1904–1990) This leading behaviorist rejected introspection and studied how consequences shape behavior.



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Sigmund Freud (1856–1939) The controversial ideas of this famed personality theorist and therapist have influenced humanity's self-understanding.

Humanistic Psychology

As the behaviorists had rejected the early 1900's definition of *psychology*, other groups rejected the behaviorist definition. In the 1960s, **humanistic psychologists,** led by Carl Rogers and Abraham Maslow, found both behaviorism and Freudian psychology too limiting. Rather than focusing on conditioned responses or childhood memories, the humanistic psychologists focused on our potential for personal growth. (More about the humanistic psychologists in Module 57.)

humanistic psychology

a historically significant perspective that emphasized human growth potential.

✓ Check Your Understanding

Ask Yourself

- Before this course, how would you have characterized the influence of Freudian theories in psychology? Would you have placed this influence in a historical or modern context?

Test Yourself

- From the 1920s to the 1960s, the two major forces in psychology were ________________ and ________________ psychology.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 1 REVIEW

1-1 How is psychology a science, and why is it the “rat is always right”?

- Psychology’s findings are the result of careful observation and testing, and the so-called “rat” (as in a psychologist’s maze, for example) is always right, because the facts are the facts even when we find them surprising.

1-2 What are the three key elements of the scientific attitude, and how do they support scientific inquiry?

- The scientific attitude equips us to be curious, skeptical, and humble in scrutinizing competing ideas or our own observations.

1-3 How does critical thinking feed a scientific attitude, and smarter thinking for everyday life?

- Critical thinking puts ideas to the test by examining assumptions, appraising the source, discerning hidden biases, evaluating evidence, and assessing conclusions.

1-4 How did psychology develop from early understandings of mind and body to the beginnings of modern science?

- The ancient Greeks—Plato and Aristotle—pondered whether mind and body are connected or distinct, and whether human ideas are innate or result from experience.
- Descartes and Locke reengaged those ancient debates, with Locke offering his famous description of the mind as a “blank slate” on which experience writes. The ideas of Bacon and Locke contributed to the development of modern *empiricism*.

1-5 What were some important milestones in psychology’s early development?

- Wilhelm Wundt established the first psychological laboratory in 1879 in Germany.
- Two early schools of thought in psychology were *structuralism* and *functionalism.*
- Structuralism, promoted by Wundt and Titchener, used self-reflection to learn about the mind’s structure. Functionalism, promoted by James, explored how behavior and thinking function.

1-6 How did behaviorism, Freudian psychology, and humanistic psychology further the development of psychological science?

- Early researchers defined *psychology* as “the science of mental life.” In the 1920s, under the influence of John B. Watson and the behaviorists, the field’s focus changed to the “scientific study of observable behavior.” *Behaviorism* became one of psychology’s two major forces well into the 1960s.
- The second major force of *Freudian psychology*, along with the influence of *humanistic psychology*, revived interest in the study of mental processes.

Multiple-Choice Questions[1]

1. By seeking to measure “atoms of the mind,” who established the first psychology laboratory?

a. Edward Bradford Titchener
b. Margaret Floy Washburn
c. Wilhelm Wundt
d. G. Stanley Hall
e. William James

2. Which philosopher proposed that nerve pathways allowed for reflexes?

a. Socrates
b. René Descartes
c. John Locke
d. Aristotle
e. Plato

3. Who coined the term *tabula rasa* (blank slate) to help explain the impact experience has on shaping an individual?

a. Francis Bacon
b. René Descartes
c. Edward Bradford Titchener
d. Mary Whiton Calkins
e. John Locke

4. Which of the following best describes research typical of Wilhelm Wundt's first psychology laboratory?

a. Testing ESP using a wall to observe auras above participants' head
b. Using a brain-scanning device to determine the impact events have on brain function
c. Measuring the reaction time between hearing a sound and pressing a button
d. Studying helping behavior, based on the premise that people are good
e. Making careful observations of animal spirits

5. With which of the following statements would John B. Watson most likely agree?

a. Psychology should study the growth potential in all people.
b. Psychology should study the unconscious mind.
c. Psychology should focus on observable behavior.
d. Psychology should study mental thought processes.
e. Psychology should study how culture and beliefs impact an individual.

Practice FRQs

1. Explain why each of the following people were significant in the history of psychology:

- William James
- Mary Whiton Calkins
- Margaret Floy Washburn

Answer

1 point: William James was a key proponent of the functionalist school of thought. He authored the first psychology textbook and courageously mentored Mary Whiton Calkins. Page 8

1 point: Mary Whiton Calkins was the first woman to complete the work necessary for a psychology Ph.D. (from Harvard), though she was denied that degree due to her gender. She was a distinguished memory researcher and was the first female president of the American Psychological Association (APA). Page 8

1 point: Margaret Floy Washburn earned the first official psychology Ph.D. She wrote an influential book, *The Animal Mind*, and was the second female president of the APA. Page 9

2. Analyze how curiosity, skepticism, and humility enable you to distinguish between gut intuition (feeling like you know something) and the scientific attitude (seeking to verify what you know with evidence).

(3 points)

AP® EXAM TIP

FRQ stands for “Free-Response Question.” The AP® exam contains two of these essay-style questions, which count for one-third of your final score. The actual FRQs will be complex, requiring you to integrate knowledge from across multiple modules, like the practice questions you will find at the end of each unit in this text. These simpler “Practice FRQs” that appear at the end of each module, along with a sample grading rubric, will help you get started practicing this skill.

Module 2 Today's Psychology and Its Approaches

LEARNING TARGETS

- 2-1 Describe how contemporary psychology focuses on cognition, biology and experience, culture and gender, and human flourishing.
- 2-2 Describe the biopsychosocial approach and psychology's main theoretical perspectives.
- 2-3 Explain how psychological principles can help you learn, remember, and thrive, and do better on the AP® exam.

Contemporary Psychology

2-1 How has contemporary psychology focused on cognition, biology and experience, culture and gender, and human flourishing?

Simultaneous with humanistic psychology’s emergence, psychologists in the 1960s pioneered a *cognitive revolution.* This led the field back to its early interest in *cognition*—how our mind processes and retains information. **Cognitive psychology** today continues its scientific exploration of how we perceive, process, and remember information and of how thinking and emotion interact in anxiety, depression, and other disorders. The marriage of cognitive psychology (the science of mind) and neuroscience (the science of brain) gave birth to **cognitive neuroscience.** This specialty, with researchers in many disciplines, studies the brain activity underlying mental activity.

cognitive psychology

the study of mental processes, such as occur when we perceive, learn, remember, think, communicate, and solve problems.

cognitive neuroscience

the interdisciplinary study of the brain activity linked with cognition (including perception, thinking, memory, and language).

Today’s psychology builds on the work of many earlier scientists and schools of thought. To encompass psychology’s concern with observable behavior *and* with inner thoughts and feelings, we now define **psychology** as the *science of behavior and mental processes.* Let’s unpack this definition. *Behavior* is anything an organism *does*—any action we can observe and record. Yelling, smiling, blinking, sweating, talking, and questionnaire marking are all observable behaviors. *Mental processes* are the internal, subjective experiences we infer from behavior—sensations, perceptions, dreams, thoughts, beliefs, and feelings.

psychology

the science of behavior and mental processes.

The key word in psychology's definition is *science*. Psychology is less a set of findings than a way of asking and answering questions. Our aim, then, is not merely to report results but also to show you how psychologists play their game. You will see how researchers evaluate conflicting opinions and ideas. And you will learn how all of us, whether scientists or simply curious people, can think harder and smarter when experiencing and explaining the events of our lives.

Psychology has roots in many disciplines and countries. The young science of psychology developed from the more established fields of philosophy and biology. Wundt was both a philosopher and a physiologist. James was an American philosopher. Freud was an Austrian physician. Ivan Pavlov, who pioneered the study of learning, was a Russian physiologist. Jean Piaget, the last century's most influential observer of children, was a Swiss biologist. These "Magellans of the mind," as psychology historian Morton Hunt (1993) called them, illustrate the diversity of psychology's origins.

Like those pioneers, today's estimated 1+ million psychologists are citizens of many lands (Zoma & Gielen, 2015). The International Union of Psychological Science has 82 member nations, from Albania to Zimbabwe. In China, the first university psychology department was established in 1978; by 2016 there were some 270, not counting AP® Psychology courses now taught in some secondary schools (Zhang, 2016). Moreover, thanks to international publications, joint meetings, and the Internet, collaboration and communication cross borders more than ever. Psychology is *growing*, and it is *globalizing*. The story of psychology—the subject of this book—continues to develop in many places, at many levels, with interests ranging from the study of nerve cell activity to the study of international conflicts. Contemporary psychology, shaped by many forces, is particularly influenced by our understanding of biology and experience, culture and gender, and human flourishing.

Evolutionary Psychology and Behavior Genetics

Are our human traits inherited, or do they develop through experience? This has been psychology’s biggest and most persistent issue. As we have seen, the debate over the **nature–nurture issue** is ancient. The ancient Greeks debated this, with Socrates and Plato assuming that we inherit character and intelligence and that certain ideas are also inborn, and Aristotle countering that there is nothing in the mind that does not first come in from the external world through the senses.

nature–nurture issue

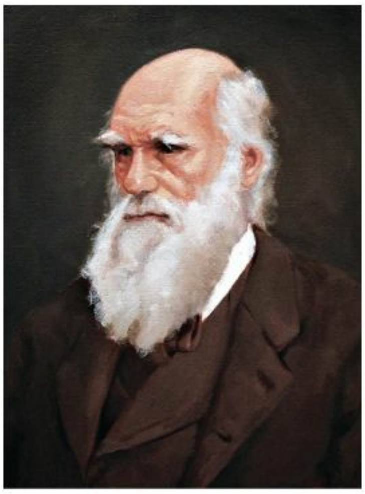
the longstanding controversy over the relative contributions that genes and experience make to the development of psychological traits and behaviors. Today’s science sees traits and behaviors arising from the interaction of nature and nurture.

In the 1600s, philosophers rekindled the debate. Locke rejected the notion of inborn ideas, suggesting that the mind is a blank slate on which experience writes. Descartes disagreed, believing that some ideas are innate. Descartes’ views gained support from a curious naturalist two centuries later.

AP® EXAM TIP

Pay close attention to what your authors, David Myers and Nathan DeWall, are emphasizing as they tell the story of psychology. When they say the nature–nurture issue is the *biggest* issue in psychology, that’s a sign that it’s likely to be covered on the AP® exam.

In 1831, an indifferent student but ardent collector of beetles, mollusks, and shells set sail on a historic round-the-world journey. The 22-year-old voyager, Charles Darwin, pondered the incredible species variation he encountered, including tortoises on one island that differed from those on nearby islands. Darwin's 1859 *On the Origin of Species* explained this diversity by proposing the evolutionary process of **natural selection**: From among chance variations, nature selects traits that best enable an organism to survive and reproduce in a particular environment. Darwin's principle of natural selection—what philosopher Daniel Dennett (1996) has called "the single best idea anyone has ever had"—is still with us 150+ years later as biology's organizing principle. Evolution also has become an important principle for twenty-first-century psychology. This would surely have pleased Darwin, who believed his theory explained not only animal structures (such as a polar bear's white coat) but also animal behaviors (such as the emotional expressions associated with human lust and rage).



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Charles Darwin (1809–1882) Darwin argued that natural selection shapes behaviors as well as bodies.

natural selection

the principle that inherited traits that better enable an organism to survive and reproduce in a particular environment will (in competition with other trait variations) most likely be passed on to succeeding generations.

The nature–nurture issue recurs throughout this text as today's psychologists explore the relative contributions of biology and experience. They ask, for example, how are we humans *alike* because of our common biology and evolutionary history? That's the focus of **evolutionary psychology**. And how do we individually *differ* because of our differing genes and environments? That's the focus of **behavior genetics**.

Left: rubberball/Getty Images, Right: © Tony Freeman/PhotoEdit – All rights reserved.

A nature-made nature–nurture experiment Identical twins (left) have the same genes. This makes them ideal participants in studies designed to shed light on hereditary and environmental influences on personality, intelligence, and other traits. Fraternal twins (right) have different genes but often share a similar environment. Twin studies provide a wealth of findings—described in later modules—showing the importance of both nature and nurture.

evolutionary psychology

the study of the evolution of behavior and the mind, using principles of natural selection.

behavior genetics

the study of the relative power and limits of genetic and environmental influences on behavior.

We can, for example, ask: Are gender differences biologically predisposed or socially constructed? Is children's grammar mostly innate or formed by experience? How are intelligence and personality differences influenced by heredity and by environment? Are sexual behaviors more "pushed" by inner biology or "pulled" by external incentives? Should we treat psychological disorders—depression, for example—as disorders of the brain, disorders of thought, or both?

Such debates continue. Yet over and again we will see that in contemporary science the nature–nurture tension dissolves: *Nurture works on what nature provides.* Our species is biologically endowed with an enormous capacity to learn and adapt. Moreover, every psychological event (every thought, every emotion) is simultaneously a biological event. Thus, depression can be both a brain disorder and a thought disorder.

✓ Check Your Understanding

Ask Yourself

- Think of one of your own unique traits. How do you think that trait was affected by the influences of nature and nurture?

Test Yourself

- How did the cognitive revolution affect the field of psychology?
- What is natural selection?
- What is contemporary psychology's position on the nature–nurture issue?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Cross-Cultural and Gender Psychology

What can we learn about people in general from psychological studies done in one time and place—often with participants from what psychologists have called the WEIRD cultures (*W*estern, *E*ducated, *I*ndustrialized, *R*ich, and *D*emocratic [Henrich et al., 2010])? As we will see time and again, **culture**—shared ideas and behaviors that one generation passes on to the next—matters. Our culture shapes our behavior. It influences our standards of promptness and frankness, our attitudes toward premarital sex and varying body shapes, our tendency to be casual or formal, our willingness to make eye contact, our conversational distance, and much, much more. Being aware of such differences, we can restrain our assumptions that others will think and act as we do.

culture

the enduring behaviors, ideas, attitudes, values, and traditions shared by a group of people and transmitted from one generation to the next.

Left: Mark Cuthbert/Getty Images, Right: Hemis/Alamy

Culture and kissing Kissing crosses cultures. Yet how we do it varies. Imagine yourself kissing someone on the lips. Do you tilt your head right or left? In Western cultures, in which people read from left to right, about two-thirds of couples kiss right, as in William and Kate’s famous kiss, and in Auguste Rodin’s sculpture, *The Kiss*. In one study, 77 percent of Hebrew- and Arabic-language right-to-left readers kissed tilting left (Shaki, 2013).

It is also true, however, that our shared biological heritage unites us as a universal human family. The same underlying processes guide people everywhere. Some examples:

- People diagnosed with *specific learning disorder* (formerly called dyslexia) exhibit the same brain malfunction whether they are Italian, French, or British (Paulesu et al., 2001).

- Variation in languages may impede communication across cultures. Yet all languages share deep principles of grammar, and people from opposite global hemispheres can communicate with a smile or a frown.
- People in different cultures vary in feelings of loneliness (Lykes & Kemmelmeier, 2014). But across cultures, loneliness is magnified by shyness, low self-esteem, and being unmarried (Jones et al., 1985; Rokach et al., 2002).

> “*All people are the same; only their habits differ.*”
>
> *Confucius, 551–479* B.C.E.

We are each in certain respects like all others, like some others, and like no other. Studying people of all races and cultures helps us discern our similarities and our differences, our human kinship and our diversity.

You will see throughout this book that one’s socially defined *gender* (as well as one’s biologically defined sex) matters, too. Today’s researchers report gender differences in what we dream, in how we express and detect emotions, and in our risk for alcohol use disorder, depression, and eating disorders. Gender differences fascinate us, and studying them is potentially beneficial. For example, many researchers have observed that women carry on conversations more readily to build relationships, while men talk more to give information and advice (Tannen, 2001). Understanding these differences can help us prevent conflicts and misunderstandings in everyday interactions.

But again, psychologically as well as biologically, women and men are overwhelmingly similar. Whether female or male, we learn to walk at about the same age. We experience the same sensations of light and sound. We remember vivid emotional events and forget mundane details. We feel the same pangs of hunger, desire, and fear. We exhibit similar overall intelligence and well-being.

The point to remember: Even when specific attitudes and behaviors vary by gender or across cultures, as they often do, the underlying processes are much the same.

Positive Psychology

Psychology's first hundred years often focused on understanding and treating troubles, such as abuse and anxiety, depression and disease, prejudice and poverty. Much of today's psychology continues the exploration of such challenges. Without slighting the need to repair damage and cure disease, Martin Seligman and others (2002, 2005, 2011) have called for more research on *human flourishing.* These psychologists call their approach **positive psychology.** They believe that happiness is a by-product of a pleasant, engaged, and meaningful life. Thus, positive psychology uses scientific methods to explore the building of a "good life" that engages our skills and a "meaningful life" that points beyond ourselves.

positive psychology

the scientific study of human flourishing, with the goals of discovering and promoting strengths and virtues that help individuals and communities to thrive.

The Biopsychosocial Approach and Psychology’s Theoretical Perspectives

2-2 What is the biopsychosocial approach, and what are psychology’s main theoretical perspectives?

Each of us is a complex system that is part of a larger social system. But each of us is also composed of smaller systems, such as our nervous system and body organs, which are composed of still smaller systems—cells, molecules, and atoms.

These tiered systems offer complementary outlooks. Consider horrific school shootings. Have they occurred because the shooters have brain disorders or genetic tendencies that cause them to be violent? Because they have observed brutality and mayhem in the media or played violent video games? Because they live in a gun-toting society? Such perspectives are complementary. Together, the biological, psychological, and social-cultural viewpoints form an integrated **biopsychosocial approach** (**Figure 2.1**).

biopsychosocial approach

an integrated approach that incorporates biological, psychological, and social-cultural viewpoints.

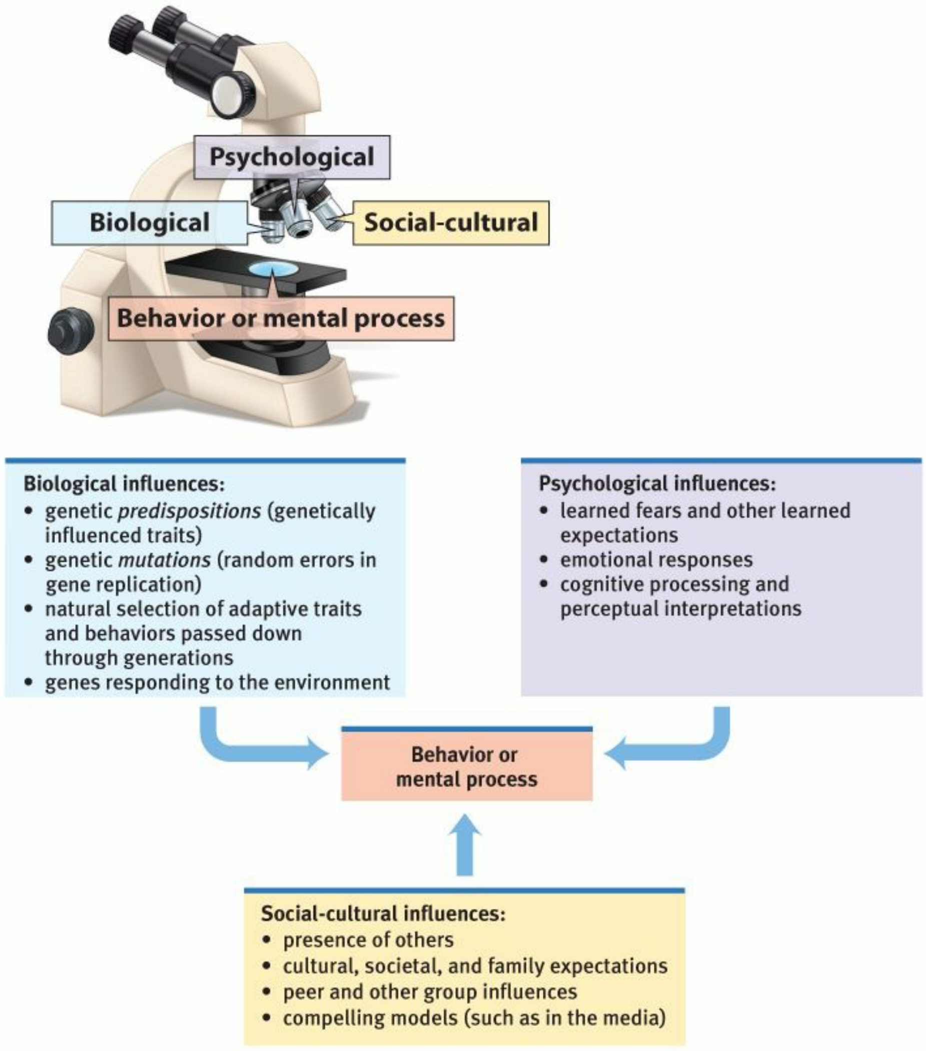
Psychological
Biological
Social-cultural
Behavior or mental process
Biological influences:
• genetic *predispositions* (genetically influenced traits)
• genetic *mutations* (random errors in gene replication)
• natural selection of adaptive traits and behaviors passed down through generations
• genes responding to the environment
Psychological influences:
• learned fears and other learned expectations
• emotional responses
• cognitive processing and perceptual interpretations
Behavior or mental process
Social-cultural influences:
• presence of others
• cultural, societal, and family expectations
• peer and other group influences
• compelling models (such as in the media)

Figure 2.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 2.1 Biopsychosocial approach

This integrated approach incorporates three viewpoints to offer a more complete picture of any given behavior or mental process.

AP® EXAM TIP

You will see versions of Figure 2.1 throughout the text. Spend some time right now familiarizing yourself with how the figure's three viewpoints might contribute to behavior or mental processes, the very stuff of psychology.

Within this broad approach, psychology has more focused theoretical perspectives. Each offers a way of looking at a behavior or mental process, yet each by itself is incomplete. Each theoretical perspective described in **Table 2.1** asks different questions and has its limits. Together they complement one another. Consider, for example, how they shed light on anger:

- Someone working from the **behavioral** perspective might attempt to determine what triggers angry responses or aggressive acts.
- Someone working from the **biological** perspective might study brain circuits that cause us to be red in the face and “hot under the collar,” or how heredity and experience influence our individual differences in temperament.
- Someone working from the *cognitive* perspective might study how our interpretation of a situation affects our anger and how our anger affects our thinking.
- Someone working from the *evolutionary* perspective might analyze how anger facilitated the survival of our ancestors’ genes.
- Someone working from the *humanistic* perspective (a historically important approach defined earlier in this unit) might be interested in understanding how angry feelings affect a person’s potential for growth. As we will see, modern-day *positive psychology* incorporates humanistic psychology’s emphasis on human flourishing.
- Someone working from the **psychodynamic** perspective (which evolved from Freud’s psychoanalysis) might view an outburst as an outlet for unconscious hostility.
- Someone working from the **social-cultural** perspective might explore how expressions of anger vary across cultural contexts.

TABLE 2.1 Psychology’s Theoretical Perspectives

Perspective	**Focus**	**Sample Questions**
Behavioral	How we learn observable responses	How do we learn to fear particular objects or situations? What is the most effective way to alter our behavior, for example, to lose weight?

Biological	How the body and brain enable emotions, memories, and sensory experiences; how our genes and our environment influence our individual differences	How do pain messages travel from the hand to the brain? How is blood chemistry linked with moods and motives? To what extent are psychological traits such as intelligence, personality, sexual orientation, and vulnerability to depression products of our genes? Of our environment?
Cognitive	How we encode, process, store, and retrieve information	How do we use information in remembering? Reasoning? Solving problems?
Evolutionary	How the natural selection of traits has promoted the survival of genes	How does evolution influence behavior tendencies?
Humanistic	How we achieve personal growth and self-fulfillment	How can we work toward fulfilling our potential? How can we overcome barriers to our personal growth?
Psychodynamic	How behavior springs from unconscious drives and conflicts	How can someone's personality traits and disorders be explained by unfulfilled wishes and childhood traumas?
Social-cultural	How behavior and thinking vary across situations and cultures	How are we affected by the people around us, and by our surrounding culture?

behavioral psychology

the scientific study of observable behavior, and its explanation by principles of learning.

biological psychology

the scientific study of the links between biological (genetic, neural, hormonal) and psychological processes. (Some biological psychologists call themselves *behavioral neuroscientists, neuropsychologists, behavior geneticists, physiological psychologists,* or *biopsychologists.*)

psychodynamic psychology

a branch of psychology that studies how unconscious drives and conflicts influence behavior and uses that information to treat people with psychological disorders.

social-cultural psychology

the study of how situations and cultures affect our behavior and thinking.

AP® EXAM TIP

These perspectives will come up again and again throughout your AP® Psychology course, and they likely *will* be on the exam. You need to become very comfortable with the meaning of terms such as *behavioral, cognitive,* and *psychodynamic.* Ask your teacher for clarification if you are the least bit unclear about what the perspectives mean.

The point to remember: Like two-dimensional views of a three-dimensional object, each of psychology's perspectives is helpful. But each by itself fails to reveal the whole picture.

With perspectives ranging from the biological to the social, psychology relates to many fields. As we will see in Module 3, psychologists may be found in settings ranging from the laboratory to the clinic to the office. They may teach in medical schools, law schools, and high schools, or work in hospitals, factories, and corporate offices. They engage in interdisciplinary studies, such as psychohistory (the study of people's historical motivations), psycholinguistics (the study of language and thinking), and psychoceramics (the study of crackpots).[1]

Syda Productions/Shutterstock

Views of anger How would each of psychology’s theoretical perspectives explain what’s going on here?

Psychology also influences modern culture. Knowledge transforms us. Learning about the solar system and the germ theory of disease alters the way people think and act. Learning about psychology’s findings also changes people: They less often judge psychological disorders as moral failings, treatable by punishment and ostracism. They less often regard and treat women as men’s mental inferiors. They less often view and raise children as ignorant, willful beasts in need of taming. “In each case,” noted Morton Hunt (1990, p. 206), “knowledge has modified attitudes, and, through them, behavior.” Once aware of psychology’s well-researched ideas—about how body and mind connect, how a child’s mind grows, how we construct our perceptions, how we learn and remember, how people across the world are alike (and different)—your mind may never again be quite the same.

> “*Once expanded to the dimensions of a larger idea, [the mind] never returns to its original size.*”
>
> *Oliver Wendell Holmes, 1809–1894*

But bear in mind psychology’s limits. Don’t expect it to answer the ultimate questions, such as those posed by Russian novelist Leo Tolstoy (1904): “Why should I live? Why should I do anything? Is there in life any purpose which the inevitable death that awaits me does not undo and destroy?"

Although many of life's significant questions are beyond psychology, some very important ones are illuminated by even a first psychology course. Through painstaking research, psychologists have gained insights into brain and mind, dreams and memories, depression and joy. Even the unanswered questions can renew our sense of mystery about things we do not yet understand. And, as you will see in Modules 4–8, your study of psychology can help teach you how to ask and answer important questions as you evaluate competing ideas and claims.

Psychology deepens our appreciation for how we humans perceive, think, feel, and act. By so doing it can enrich our lives and enlarge our vision. Through this book we hope to help guide you toward that end. As educator Charles Eliot said a century ago: "Books are the quietest and most constant of friends, and the most patient of teachers."

✓ Check Your Understanding

Ask Yourself

- How have your cultural experiences influenced your development?
- When you signed up for this course, what did you think psychology would be all about?

Test Yourself

- What advantage do we gain by using the biopsychosocial approach in studying psychological events?
- The____________ ____________ perspective in psychology focuses on how behavior and thought differ from situation to situation and from culture to culture, while the _______________ perspective emphasizes observation of how we respond to and learn in different situations.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Use Psychology to Become a Stronger Person—and a Better Student

2-3 How can psychological principles help you learn, remember, and thrive, and do better on the AP® exam?

Throughout this text, we will offer evidence-based suggestions that you can use to live a happy, effective, flourishing life, including the following:

- *Get a full night's sleep.* Unlike sleep-deprived people, who live with fatigue and gloomy moods, well-rested people live with greater energy, alertness, and productivity.
- *Make space for exercise.* Aerobic activity not only increases health and energy, it also is an effective remedy for mild to moderate depression and anxiety.
- *Set long-term goals, with daily aims.* Successful people take time each day to work toward their goals, such as exercising or sleeping more, or eating more healthfully. Over time, they often find that their daily practice becomes a habit.
- *Have a "growth mindset."* Rather than seeing their abilities as fixed, successful people view their mental abilities as like a muscle—something that grows stronger with effortful use.
- *Prioritize relationships.* We humans are social animals. We flourish when connected in close relationships. We are both happier and healthier when supported by (and supporting) caring friends.

Psychology's research also shows how we can learn and retain information. Many students assume that the way to cement new learning is to reread. What helps even more—and what this book therefore encourages—is repeated self-testing and rehearsal of previously studied material. Memory researchers Henry Roediger and Jeffrey Karpicke (2006) call this phenomenon the **testing effect**. They note that "testing is a powerful means of improving learning, not just assessing it." In one of their studies, English-speaking students recalled the meaning of 40 previously learned Swahili words much better if tested repeatedly than if they spent the same time restudying the words (Karpicke & Roediger, 2008). Many other studies, including in college classrooms, confirm that *frequent quizzing and self-testing boosts students' retention* (McDaniel et al., 2015; Trumbo et al., 2016).

testing effect

enhanced memory after retrieving, rather than simply rereading, information. Also referred to as a *retrieval practice effect* or *test-enhanced learning.*

As you will see in Modules 31–33, to master information you must *actively process it.* Your mind is not like your stomach, something to be filled passively; it grows stronger only with effort. Countless experiments reveal that people learn and remember best when they put material in their own words, rehearse it, and then retrieve and review it again.

The **SQ3R** study method incorporates these principles (McDaniel et al., 2009; Robinson, 1970). SQ3R is an acronym for its five steps: *S*urvey, *Q*uestion, *R*ead, *R*etrieve,[2] *R*eview. We have organized this book in a way that facilitates your use of the SQ3R study system.

SQ3R

a study method incorporating five steps: *S*urvey, *Q*uestion, *R*ead, *R*etrieve, *R*eview.

To study a module, first *survey*, taking a bird's-eye view. Scan the headings, and notice how the module is organized. Before you read each main section, try to answer its numbered Learning Target (for this section: "How can psychological principles help you learn, remember, and thrive, and do better on the AP® exam?"). Roediger and Bridgid Finn (2010) have found that "trying and failing to retrieve the answer is actually helpful to learning." Those who test their understanding *before* reading, and discover what they don’t yet know, will learn and remember better.

Then *read*, actively searching for the answer to the question. At each sitting, read only as much of the module (usually a single main section) as you can absorb without tiring. Read actively and critically. Ask questions. Take notes. Make the ideas your own: How does what you’ve read relate to your own life? Does it support or challenge your assumptions? How convincing is the evidence?

> “*It pays better to wait and recollect by an effort from within, than to look at the book again.*”
>
> *William James*, Principles of Psychology, *1890*

Having read a section, *retrieve* its main ideas: “Active retrieval promotes meaningful learning,” says Karpicke (2012). So *test yourself*. This will not only help you figure out what you know, the testing itself will help you learn and retain the information more effectively. Even better, test yourself repeatedly. We offer many self-testing opportunities throughout each module—for example, in the Check Your Understanding sections. After answering the Test Yourself questions there, you can check your answers in Appendix E at the end of this text and reread as needed.

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More learning tips To learn more about the testing effect and the SQ3R method, view the 5-minute animation “Make Things Memorable,” at tinyurl.com/HowToRemember.

Finally, *review:* Read over any notes you have taken, again with an eye on the module’s organization, and quickly review the whole module. Write or say what a concept is before rereading to check your understanding. The *Module Review* provides answers to the learning target questions along with helpful review questions. The *Unit Review* offers Key Terms and Key Contributors, along with AP® Exam Practice Questions. In addition to learning psychology's key concepts and key people, you will also need to learn the style of writing that is required for success on the exam. The sample grading rubrics provided for some of the *Free-Response Questions* (essay-style questions) in the module and unit reviews will help get you started.

Four additional study tips may further boost your learning:

Distribute your study time. One of psychology's oldest findings is that *spaced practice* promotes better retention than *massed practice.* You'll remember material better if you space your time over several study periods —perhaps one hour a day, six days a week—rather than cram it into one week-long or all-night study blitz. For example, rather than trying to read an entire module in a single sitting, read just one main section and then turn to something else. *Interleaving* your study of psychology with your study of other subjects boosts long-term retention and protects against overconfidence (Kornell & Bjork, 2008; Taylor & Rohrer, 2010).

Spacing your study sessions requires a disciplined approach to managing your time. At the beginning of this text, Richard O. Straub explains time management in a helpful preface.

Learn to think critically. Whether you are reading or in class, note people's assumptions and values. What viewpoint or bias underlies an argument? Evaluate evidence. Is it anecdotal? Or is it based on informative experiments? (More on this in Module 6.) Assess conclusions. Are there alternative explanations?

Process class information actively. Listen for the main ideas and sub-ideas of a lesson. *Write them down.* Ask questions during and after class. In class, as with your homework, process the information actively, and you will understand and retain it better. As psychologist William James urged a century ago, "*No reception without reaction, no impression without . . . expression*." Make the information your own. Relate what you read to what you already know. Tell someone else about it. (As any teacher will confirm, to teach is to remember.)

Also, take notes *by hand*. Handwritten notes, in your own words, typically engage more active processing, with better retention, than does verbatim note taking on laptops (Mueller & Oppenheimer, 2014).

Overlearn. Psychology tells us that overlearning improves retention. We are prone to overestimating how much we know. You may understand a module as you read it, but that feeling of familiarity can be deceptively comforting. By using the Check Your Understanding questions, you can test your knowledge and *overlearn* in the process.

Memory experts Elizabeth Bjork and Robert Bjork (2011) offer simple, scientifically-supported advice for how to improve your retention and your grades:

> Spend less time on the input side and more time on the output side, such as summarizing what you have read from memory or getting together with friends and asking each other questions. Any activities that involve testing yourself—that is, activities that require you to retrieve or generate information, rather than just representing information to yourself—will make your learning both more durable and flexible. (p. 63)

✓ Check Your Understanding

Ask Yourself

- Of all of these helpful principles, which ones seem most relevant and important for improving your own life and studies?

Test Yourself

- The ______________ ______________ describes the enhanced memory that results from repeated retrieval (as in self-testing) rather than from simple rereading of new information.

- What does the acronym *SQ3R* stand for?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 2 REVIEW

2-1 How has contemporary psychology focused on cognition, biology and experience, culture and gender, and human flourishing?

- The cognitive revolution in the 1960s led psychology back to its early interest in the mind, and its current definition as the science of behavior and mental processes.
- Our growing understanding of biology and experience has fed psychology's most enduring debate. The *nature–nurture issue* centers on the relative contributions of genes and experience, and their interaction in specific environments.
- Charles Darwin's view that *natural selection* shapes behaviors as well as bodies led to *evolutionary psychology's* study of our similarities because of our common biology and evolutionary history, and *behavior genetics'* focus on the relative power and limits of genetic and environmental influences on behavior.
- Cross-cultural and gender studies have diversified psychology's assumptions while also reminding us of our similarities. Attitudes and behaviors may vary somewhat by gender or across *cultures*, but because of our shared human kinship, the underlying processes and principles are more similar than different.
- Psychology's traditional focus on understanding and treating troubles has expanded with *positive psychology's* call for more research on human flourishing and its attempt to discover and promote traits that help people to thrive.

2-2 What is the biopsychosocial approach, and what are psychology's main theoretical perspectives?

- The *biopsychosocial approach* integrates information from three differing but complementary viewpoints: biological, psychological, and social-cultural.

- This approach offers a more complete understanding than could usually be reached by relying on only one of psychology's theoretical perspectives (*behavioral*, *biological*, *cognitive*, *evolutionary*, *humanistic*, *psychodynamic*, and *social-cultural*).

2-3 How can psychological principles help you learn, remember, and thrive, and do better on the AP® exam?

- The *testing effect* shows that learning and memory are enhanced by actively retrieving, rather than simply rereading, previously studied material.
- The *SQ3R* study method—survey, question, read, retrieve, and review—applies principles derived from memory research and can help you learn and remember material.
- Four additional study tips are (1) distribute your study time, (2) learn to think critically, (3) process class information actively, and (4) overlearn.
- Psychological research has shown that people who live happy, thriving lives (1) manage their time to get a full night's sleep, (2) make space for exercise, (3) have a growth mindset, and (4) prioritize relationships.

Multiple-Choice Questions

1. Which of the following is a major issue in modern-day psychology?

a. Evolutionary–biological
b. Social-cultural–biopsychosocial
c. Nature–nurture
d. Psychodynamic–cognitive
e. Social-cultural–behavioral

2. Which of the following perspectives is most likely to address how the encoding, storing, and retrieval of information might alter our thoughts?

a. Evolutionary
b. Psychodynamic
c. Humanistic
d. Cognitive
e. Biological

3. Which of the following perspectives would be most likely to examine the unconscious motives of a person who is overly aggressive on the basketball court?

a. Psychodynamic
b. Social-cultural
c. Behavioral
d. Evolutionary
e. Humanistic

4. Positive psychology, which studies the ideas behind human flourishing, is connected to which psychologist?

a. John Locke
b. Martin Seligman
c. Charles Darwin
d. Sigmund Freud
e. John Watson

Practice FRQs

1. At the end of this course, you will probably be taking the AP® Psychology exam. Explain how you could use the following concepts to help you succeed on that test.

- Testing effect
- Spaced practice
- SQ3R

Answer

1 point: Testing effect: Students should frequently test themselves, over the course of the year, on the material they are currently learning as well as the material they have already learned. Page 20

1 point: Spaced practice: Studying should be spaced out over the entire span of the course and not crammed into the last days or hours before the AP® exam. Page 21

1 point: SQ3R: Students should use the Survey-Question-Read-Retrieve-Review method in order to most effectively learn the material for the entire course. This will allow them to process the information on a deeper level and retain it better over the course of the year. Page 20

2. Six months ago, Carlos emigrated from Mexico to the United States. Although fluent in English and an honor student in Mexico, Carlos has had difficulty completing his assignments since moving to the United States. His parents don't understand why he is not succeeding like he did in his last school. Carlos has quit participating in family traditions.

Explain how each of the following psychological perspectives might explain Carlos' behavior:

- Psychodynamic
- Cognitive
- Social-cultural

(3 points)

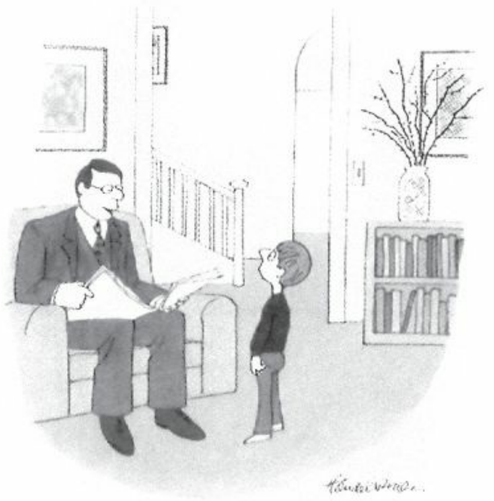
Module 3 Subfields in Psychology

LEARNING TARGETS

- 3-1 Explain the difference between basic and applied psychology.
- 3-2 Describe what psychologists working in various subfields do, and where they work.

Picturing a chemist at work, you may envision a laboratory scientist surrounded by test tubes and high-tech equipment. Picture a psychologist at work and you would be right to envision

- a white-coated scientist probing a rat’s brain.
- an intelligence researcher measuring how quickly an infant shows boredom by looking away from a familiar picture.
- an executive evaluating a new “healthy lifestyles” training program for employees.
- a researcher at a computer analyzing “big data” from Twitter or Facebook status updates.
- a therapist actively listening to a depressed client’s thoughts.
- a traveling academic visiting another culture and collecting data on variations in human values and behaviors.
- a teacher or writer sharing the joy of psychology with others.



The New Yorker Collection, 1986, J.B. Handelsman from
cartoonbank.com

“I’m a social scientist, Michael. That means I can’t explain electricity or anything like that, but if you ever want to know about people I’m your man.”

The cluster of subfields we call psychology is a meeting ground for different disciplines. “Psychology is a hub scientific discipline,” said Association for Psychological Science past president John Cacioppo (2007). Thus, it’s a perfect home for those with wide-ranging interests.

Basic and Applied Psychology

3-1 What is the difference between basic and applied psychology?

In its diverse activities, from biological experimentation to cultural comparisons, the tribe of psychology is united by a common quest: *describing and explaining behavior and the mind underlying it.* There is even a branch of psychology, called **psychometrics,** devoted to studying the measurement of our abilities, attitudes, and traits.

psychometrics

the scientific study of the measurement of human abilities, attitudes, and traits.

Some psychologists conduct **basic research** that builds psychology’s knowledge base. We will meet a wide variety of such researchers, including

- *biological psychologists* exploring the links between body and mind.
- **developmental psychologists** studying our changing abilities from womb to tomb.
- *cognitive psychologists* experimenting with how we perceive, think, and solve problems.
- **educational psychologists** studying influences on teaching and learning.
- **personality psychologists** investigating our persistent traits.
- **social psychologists** exploring how we view and affect one another.

basic research

pure science that aims to increase the scientific knowledge base.

developmental psychology

a branch of psychology that studies physical, cognitive, and social change throughout the life span.

educational psychology

the study of how psychological processes affect and can enhance teaching and learning.

personality psychology

the study of individuals' characteristic patterns of thinking, feeling, and acting.

social psychology

the scientific study of how we think about, influence, and relate to one another.

Left: LAURENT/GLUCK/AGE Fotostock, Middle: Hope College Public Relations, Right: Scott J. Ferrell/Getty Images

Psychology: A science and a profession Psychologists experiment with, observe, test, and help modify behavior. Here we see psychologists testing a child, measuring emotion-related physiology, and doing face-to-face therapy.

These and other psychologists also may conduct **applied research**, tackling practical problems. **Industrial-organizational (I/O) psychologists**, for example, use psychology's concepts and methods in the workplace to help organizations and companies select and train employees, boost morale and productivity, design products, and implement systems. In a related subfield, **human factors psychologists** focus on the interaction of people, machines, and physical environments. (More on this subject in Enrichment Module 82.)

applied research

scientific study that aims to solve practical problems.

industrial-organizational (I/O) psychology

the application of psychological concepts and methods to optimizing human behavior in workplaces.

human factors psychology

a field of psychology allied with I/O psychology that explores how people and machines interact and how machines and physical environments can be made safe and easy to use.

Psychology is a science but also a *helping profession* that guides people toward healthier relationships, overcoming anxiety or depression, and raising thriving children. **Counseling psychologists** help people to cope with challenges and crises (including academic, vocational, and relationship issues) and to improve their personal and social functioning. **Clinical psychologists** assess and treat people with mental, emotional, and behavior disorders. Both counseling and clinical psychologists administer and interpret tests, provide counseling and therapy, and sometimes conduct basic and applied research. By contrast, **psychiatrists,** who also may provide psychotherapy, are medical doctors licensed to prescribe drugs and otherwise treat physical causes of psychological disorders.

counseling psychology

a branch of psychology that assists people with problems in living (often related to school, work, or marriage) and in achieving greater well-being.

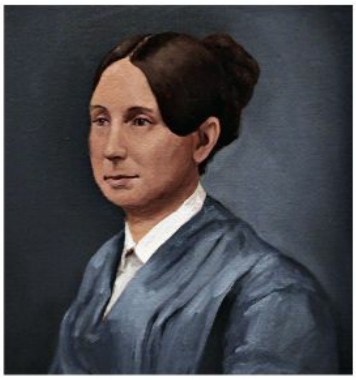
clinical psychology

a branch of psychology that studies, assesses, and treats people with psychological disorders.

psychiatry

a branch of medicine dealing with psychological disorders; practiced by physicians who are licensed to provide medical (for example, drug) treatments as well as psychological therapy.

We will study the history of therapy, including the role of pioneer Dorothea Dix, in the Therapy unit. Reformers such as Dix and Philippe Pinel led the way to humane treatment of those with psychological disorders.



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Dorothea Dix (1802–1887) “I . . . call your attention to the state of the Insane Persons confined within this Commonwealth, in cages.”

AP® EXAM TIP

Take careful note of the fact that psychiatry is a medical specialty. You should be able to summarize the similarities and differences among counseling psychologists, clinical psychologists, and psychiatrists for the AP® exam.

Rather than seeking to change people to fit their environment, **community psychologists** work to create social and physical environments that are healthy for all (Bradshaw et al., 2009; Trickett, 2009). To prevent bullying, for example, they might consider ways to improve the culture of the school and neighborhood, and how to increase bystander intervention (Polanin et al., 2012).

community psychology

a branch of psychology that studies how people interact with their social environments and how social institutions affect individuals and groups.

✓ Check Your Understanding

Ask Yourself

- Before taking this course, where would you have pictured psychologists working? Which work setting has surprised you the most so far?

Test Yourself

- Match the specialty below with the description on the right.

1. Clinical psychology	a. Works to create social and physical environments that are healthy for all.
2. Psychiatry	b. Studies, assesses, and treats people with psychological disorders but usually does not provide medical therapy.
3. Community psychology	c. Branch of medicine dealing with psychological disorders.

Answers to the Test Yourself questions can be found in [*Appendix E*]() *at the end of the book.*

Psychology’s Main Subfields

3-2 What do psychologists working in various subfields do, and where do they work?

If you major in psychology in college, you will graduate with a scientific mindset and an awareness of basic principles of human behavior (biological mechanisms, nature–nurture interactions, life-span development, cognition, psychological disorders, social interactions). This background will prepare you for success in many areas, including business, the helping professions, health services, marketing, law, sales, and teaching. You may even go on to graduate school for specialized training to become a psychology professional. This module provides an overview of some of psychology’s key subfields. Appendix D, Preparing for Further Psychology Studies, provides tips for preparing to earn a bachelor’s, master’s, or doctoral degree in psychology, with information about the career options that become available at those varying levels of education.

FYI

The “Basic Research Subfields,” “Applied Research Subfields,” and “The Helping Professions” sections were written by Jennifer Zwolinski (University of San Diego).

Let’s look at some of the basic research, applied research, and helping profession subfields (arranged alphabetically), most of which require a graduate degree for entrance.

AP® EXAM TIP

You are about to read about a lot of career possibilities in psychology. Note the division between basic subfields and applied subfields. The work of some of these specialties is pretty obvious (it’s not that hard to figure out in general what an *educational psychologist* or a *health psychologist* might do). Questions about psychology’s specialties have previously been on the AP® exam. Devote extra attention to those specialties that may be unfamiliar to you.

Basic Research Subfields

COGNITIVE PSYCHOLOGISTS study human thinking, with a focus on such topics as perception, language, attention, problem solving, memory, judgment and decision making, forgetting, and intelligence. As a cognitive psychologist, you might work as a professor, corporate consultant, or human factors specialist in an educational or business setting.

Karen Moskowitz/The Image Bank/Getty Images

Cognitive consulting Cognitive psychologists may advise businesses on how to operate more effectively by understanding the human factors involved.

DEVELOPMENTAL PSYCHOLOGISTS conduct research on age-related behavioral changes and apply their scientific knowledge to educational, child-care, policy, and related settings. As a developmental psychologist, you would investigate change across a broad range of topics, including the biological, psychological, cognitive, and social aspects of development. Developmental psychology informs a number of applied fields, including educational psychology, school psychology, child psychopathology, and gerontology. The field also informs public policy in areas such as education and child-care reform, maternal and child health, and attachment and adoption. You would probably specialize in a specific stage of the life span, such as infancy, childhood, adolescence, or middle or late adulthood. Your work setting could be an educational institution, day-care center, youth group program, or senior center.

EDUCATIONAL PSYCHOLOGISTS are interested in the psychological processes involved in learning. They study the relationship between learning and the physical and social environments, and they develop strategies for enhancing the learning process. As an educational psychologist, working in a university psychology department or school of education, you might conduct basic research on topics related to learning or develop innovative methods of teaching to enhance the learning process. You might design effective tests, including measures of aptitude and achievement. You might be employed by a school or government agency or charged with designing and implementing effective employee-training programs in a business setting.

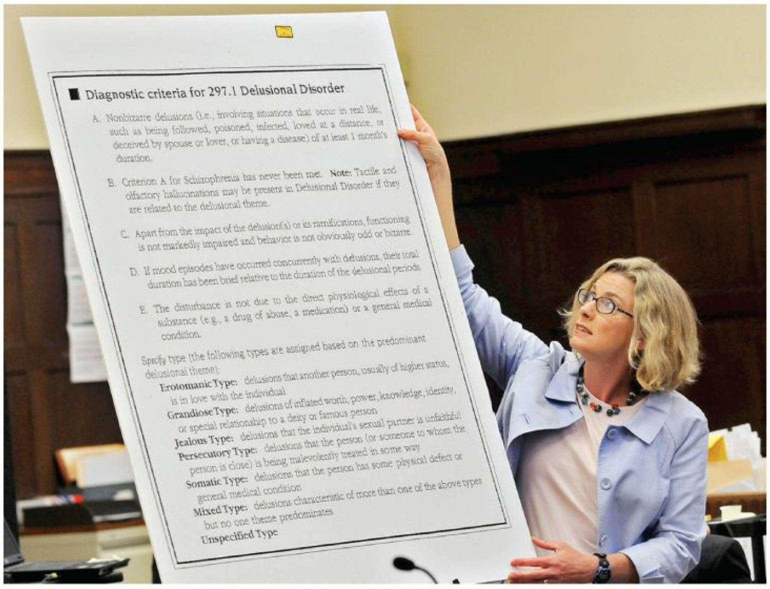
EXPERIMENTAL PSYCHOLOGISTS are a diverse group of scientists who investigate a variety of basic behavioral processes in humans and other animals. Prominent areas of experimental research include motivation, learning, perception, and language. Most experimental psychologists identify with a particular theoretical perspective, such as cognitive psychology, depending on their interests and training. Many other psychologists rely on experimental methodology to conduct studies. As an experimental psychologist, you would most likely work in an academic setting, teaching courses and supervising students’ research in addition to conducting your own research. Or you might be employed by a research institution, zoo, business, or government agency.

PSYCHOMETRIC AND QUANTITATIVE PSYCHOLOGISTS study the math-related methods used to acquire psychological knowledge. A psychometric psychologist may update existing neurocognitive or personality tests or devise new tests for use in clinical and school settings or in business and industry. These psychologists also administer, score, and interpret such tests. Quantitative psychologists collaborate with researchers to design, analyze, and interpret the results of research programs. As a psychometric or quantitative psychologist, you will need to be well trained in research methods, statistics, and computer technology. You will most likely be employed by a university or college, a testing company, a private research firm, or a government agency.

SOCIAL PSYCHOLOGISTS are interested in our interactions with others. Social psychologists study how our beliefs, feelings, and behaviors are affected by and influence other people. They study topics such as attitudes, aggression, prejudice, interpersonal attraction, group behavior, and leadership. As a social psychologist, you would probably be a college or university faculty member. You might also work in organizational consultation, market research, or other applied psychology fields, including social neuroscience. Some social psychologists work for hospitals, federal agencies, social networking sites, or businesses performing applied research.

Applied Research Subfields

FORENSIC PSYCHOLOGISTS apply psychological principles to legal issues. They conduct research on the interface of law and psychology, help to create public policies related to mental health, help law-enforcement agencies in criminal investigations, or consult on jury selection and deliberation processes. They also provide assessment to assist the legal community. Although most forensic psychologists are clinical psychologists, many have expertise in other areas of psychology, such as social or cognitive psychology. Some also hold law degrees. As a forensic psychologist, you might work in a university psychology department, law school, research organization, community mental health agency, law-enforcement agency, court, or correctional setting.



Diagnostic criteria for 297.1 Delusional Disorder

A. Nonbizarre delusions (i.e., involving situations that occur in real life, such as being followed, poisoned, infected, loved at a distance, or deceived by spouse or lover, or having a disease) of at least 1 month's duration.

B. Criterion A for Schizophrenia has never been met. **Note:** Tactile and olfactory hallucinations may be present in Delusional Disorder if they are related to the delusional theme.

C. Apart from the impact of the delusion(s) or its ramifications, functioning is not markedly impaired and behavior is not obviously odd or bizarre.

D. If mood episodes have occurred concurrently with delusions, their total duration has been brief relative to the duration of the delusional periods.

E. The disturbance is not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition.

Specify type (the following types are assigned based on the predominant delusional theme):

Erotomanic Type: delusions that another person, usually of higher status, is in love with the individual
Grandiose Type: delusions of inflated worth, power, knowledge, identity, or special relationship to a deity or famous person
Jealous Type: delusions that the individual's sexual partner is unfaithful
Persecutory Type: delusions that the person (or someone to whom the person is close) is being malevolently treated in some way
Somatic Type: delusions that the person has some physical defect or general medical condition
Mixed Type: delusions characteristic of more than one of the above types but no one theme predominates
Unspecified Type

Ted Fitzgerald/AP Images

Psychology in court Forensic psychologists apply psychology's principles and methods in the criminal justice system. They may assess witness credibility or testify in court on a defendant's state of mind and future risk.

ENVIRONMENTAL PSYCHOLOGISTS study the interaction of individuals with their natural and built (urban) environments. They are interested in how we influence and are affected by these environments. As an environmental psychologist, you might study wildlife conservation, the impact of urbanization on health, or cognitive factors involved in sustainable lifestyle choices. Environmental psychologists tend to address these kinds of questions by working with other professionals as part of an interdisciplinary team. As an environmental psychologist, you might work in a consulting firm, an academic setting, the nonprofit sector, or the government.

HEALTH PSYCHOLOGISTS are researchers and practitioners concerned with psychology's contribution to promoting health and preventing disease. As applied psychologists or clinicians, they may help individuals lead healthier lives by designing, conducting, and evaluating programs to stop smoking, lose weight, improve sleep, manage pain, prevent the spread of sexually transmitted infections, or treat psychosocial problems associated with chronic and terminal illnesses. As researchers and clinicians, they identify conditions and practices associated with health and illness to help create effective interventions. In public service, health psychologists study and work to improve government policies and health care systems. As a health psychologist, you could be employed in a hospital, medical school, rehabilitation center, public health agency, college or university, or, if you are also a clinical psychologist, in private practice.

INDUSTRIAL-ORGANIZATIONAL (I/O) PSYCHOLOGISTS study the relationship between people and their working environments. They may develop new ways to increase productivity, improve personnel selection, or promote job satisfaction in an organizational setting. Their interests include organizational structure and change, consumer behavior, and personnel selection and training. As an I/O psychologist, you might conduct workplace training or provide organizational analysis and development. You may find yourself working in business, industry, the government, or a college or university. Or you may be self-employed as a consultant or work for a management consulting firm. (For more on I/O psychology, see Appendix A, Psychology at Work.)

NEUROPSYCHOLOGISTS investigate the relationship between neurological processes (the structure and function of the brain) and behavior. As a neuropsychologist you might assess, diagnose, or treat central nervous system disorders, such as Alzheimer’s disease or stroke. You might also evaluate individuals for evidence of head injuries; learning and developmental disabilities, such as autism spectrum disorder; and other psychiatric disorders, such as attention-deficit/hyperactivity disorder (ADHD). If you are a *clinical neuropsychologist*, you might work in a hospital’s neurology, neurosurgery, or psychiatric unit. Neuropsychologists also work in academic settings, where they conduct research and teach.

REHABILITATION PSYCHOLOGISTS are researchers and practitioners who work with people who have lost optimal functioning after an accident, illness, or other event. As a rehabilitation psychologist, you would probably work in a medical rehabilitation institution or hospital. You might also work in a medical school, university, state or federal vocational rehabilitation agency, or in private practice serving people with physical disabilities.

SCHOOL PSYCHOLOGISTS are involved in the assessment of and intervention for children in educational settings. They diagnose and treat cognitive, social, and emotional problems that may negatively influence children's learning or overall functioning at school. As a school psychologist, you would collaborate with teachers, parents, and administrators, making recommendations to improve student learning. You would work in an academic setting, a federal or state government agency, a child guidance center, or a behavioral research laboratory.

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Assessing and supporting children School psychologists may find themselves working with children individually or in groups. They receive interdisciplinary training in mental health assessment and behavior analysis, research methods and design, and special needs education. They work primarily in schools but also in a range of other settings, including pediatric hospitals, mental health centers, and correctional facilities.

SPORT PSYCHOLOGISTS study the psychological factors that influence, and are influenced by, participation in sports and other physical activities. Their professional activities include coach education and athlete preparation, as well as research and teaching. Sport psychologists who also have a clinical or counseling degree can apply those skills to working with individuals with psychological problems, such as anxiety or substance abuse, that might interfere with optimal performance. As a sport psychologist, if you were not working in an academic or research setting, you would most likely work as part of a team or an organization or in a private capacity.

Phil Walter/Getty Images

Cricket cures Sport psychologists often work directly with athletes to help them improve their performance. Here a sport psychologist consults with Brendon McCullum, a record-breaking athlete who plays international cricket for New Zealand.

The Helping Professions

CLINICAL PSYCHOLOGISTS promote psychological health in individuals, groups, and organizations. Some clinical psychologists specialize in specific psychological disorders. Others treat a range of disorders, from adjustment difficulties to severe psychopathology. Clinical psychologists often provide therapy but may also engage in research, teaching, assessment, and consultation. Clinical psychologists work in a variety of settings, including private practice, mental health service organizations, schools, universities, industries, legal systems, medical systems, counseling centers, government agencies, correctional facilities, nonprofit organizations, and military services.

To become a clinical psychologist, you will need to earn a clinical psychology doctorate. The APA sets the standards for clinical psychology graduate programs, offering *accreditation* (official recognition) to those who meet their standards. In all U.S. states, clinical psychologists working in independent practice must obtain a license to offer services such as therapy and testing.

COMMUNITY PSYCHOLOGISTS move beyond focusing on specific individuals or families and deal with broad problems of mental health in community settings. These psychologists believe that human behavior is powerfully influenced by the interaction between people and their physical, social, political, and economic environments. They seek to promote psychological health by enhancing environmental settings—focusing on preventive measures and crisis intervention, with special attention to the problems of underserved groups and ethnic minorities. Some community psychologists collaborate with professionals in other areas, such as public health, with a shared emphasis on prevention. As a community psychologist, your work settings could include federal, state, and local departments of mental health, corrections, and welfare. You might conduct research or help evaluate research in health service settings, serve as an independent consultant for a private or government agency, or teach and consult as a college or university faculty member.

Paul Chiasson/AP Images

Community care Community psychologists in Haiti have helped residents work through the ongoing emotional challenges that followed the devastating 2010 earthquake and, more recently, the widely destructive 2016 hurricane.

COUNSELING PSYCHOLOGISTS help people adjust to life transitions or make lifestyle changes. Although similar to clinical psychologists, counseling psychologists typically help people with adjustment problems rather than severe psychopathology. Like clinical psychologists, counseling psychologists conduct therapy and provide assessments to individuals and groups. As a counseling psychologist, you would likely emphasize your clients’ strengths, helping them to use their own skills, interests, and abilities to cope during transitions. You might find yourself working in an academic setting as a faculty member or administrator or in a university counseling center, community mental health center, business, or private practice. As with clinical psychology, if you plan to work in independent practice you will need to obtain a state license to provide counseling services to the public.

* * *

So, the next time someone asks you what you could do if you pursue psychology in college, tell them you would have a lot of options. You might use your acquired skills and understanding to get a job and succeed in any number of fields, or you might pursue graduate school and then career opportunities in associated professions. In any case, what you learn about behavior and mental processes will surely enrich your life (Hammer, 2003).

✓ Check Your Understanding

Ask Yourself

- Which of psychology's subfields were you aware of before taking this course? Which ones seem most interesting to you?

Test Yourself

- Name each of these subfields: (a) focuses on people and their work environments; (b) studies how people change over the life span; (c) considers the human thinking involved in perceiving, remembering, speaking, and decision making; and (d) focuses on diagnosing and treating psychological disorders.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 3 REVIEW

3-1 What is the difference between basic and applied psychology?

- Within the science of psychology, researchers may conduct *basic research* to increase the field’s knowledge base (often in *biological, developmental, cognitive, educational, personality*, and *social psychology*) or *applied research* to solve practical problems (in *industrial-organizational* and *human factors psychology*, for example).

3-2 What do psychologists working in various subfields do, and where do they work?

- Psychology’s subfields include the basic research fields (cognitive, developmental, educational, experimental, psychometric and quantitative, and social psychology), the applied research fields (forensic, health, industrial-organizational, neuropsychology, rehabilitation, school, and sport psychology), and the helping professions (clinical, community, and counseling).
- Work settings for psychologists include a wide range of government agencies, industrial and business settings, clinics and counseling centers, health care institutions, schools, universities, and research organizations.

Multiple-Choice Questions

1. Who among the following would most likely study the interaction of people, machines, and physical environments?

a. Human factors psychologist
b. Personality psychologist
c. Industrial-organizational psychologist
d. Counseling psychologist
e. Educational psychologist

2. Psychiatrists differ from clinical psychologists in that they

- a. help people cope with challenges and crises.
- b. conduct research.
- c. explore how we view and affect one another.
- d. experiment with how people perceive, think, and solve problems.
- e. are medical doctors licensed to prescribe medication.

3. Which of the following psychologists most strongly emphasize that human behavior is powerfully influenced by the interaction between people and their physical, social, political, and economic environments?

- a. Community
- b. Evolutionary
- c. Educational
- d. Industrial-organizational
- e. Rehabilitation

4. Which of the following psychologists would be most likely to investigate biological, psychological, cognitive, and social changes over a lifetime?

- a. Educational
- b. Experimental
- c. Social
- d. Cognitive
- e. Developmental

5. A psychologist investigates the methods teachers use to enhance student learning. In which of the following subfield is the psychologist most likely working?

- a. Educational psychology
- b. Experimental psychology
- c. School psychology
- d. Social psychology
- e. Forensic psychology

6. A psychologist works with children whose parents are divorcing. She helps them develop skills they need to cope with the situation. Which of the following psychologists is most likely to be helping these children?

a. Industrial-organizational
b. Social
c. Research
d. Counseling
e. Community

7. Dwayne is interested in helping people make good decisions regarding their physical well-being. Dwayne should consider a career as a(n)

a. community psychologist.
b. social psychologist.
c. forensic psychologist.
d. industrial-organizational psychologist.
e. health psychologist.

Practice FRQs

1. Alex, a high school junior, has been struggling recently in many areas of his life. He is overweight and spends several hours per day watching Netflix and YouTube. He is having trouble keeping up in class and says he cannot seem to maintain his focus. He also is having trouble making friends and "fitting in" at school.

Explain how the following applied psychologists might attempt to help Alex's current situation.

- Health psychologists
- School psychologists
- Counseling psychologists

Answer

1 point: A health psychologist might work with Alex to create a suitable exercise program and to improve his diet. This should help him to become healthier overall and may increase his focus. Page 29

1 point: A school psychologist might work with Alex along with his parents, teachers, and counselors to determine why he is struggling in class and to make recommendations for improving his classroom performance. Page 29

1 point: A counseling psychologist might work with Alex to determine why he has recently found numerous aspects of his life more challenging. This psychologist might work on strategies for helping Alex to improve his social skills and to make some friends. Page 30

2. Hurricane Matthew hit Haiti in 2016, causing a staggering loss of life and infrastructure and billions of dollars in damage. How might each of the following types of psychologists contribute to making life better in Haiti following the hurricane?

- Clinical psychologists
- Social psychologists

(2 points)

UNIT I REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

Test yourself on these terms by trying to compose the definition before checking your answers.

critical thinking, p. 4
empiricism, p. 7
structuralism, p. 7
introspection, p. 8
functionalism, p. 8
behaviorism, p. 10
humanistic psychology, p. 11
cognitive psychology, p. 13
cognitive neuroscience, p. 13
psychology, p. 13
nature–nurture issue, p. 14
natural selection, p. 14
evolutionary psychology, p. 14
behavior genetics, p. 14
culture, p. 15
positive psychology, p. 16
biopsychosocial approach, p. 17
behavioral psychology, p. 17
biological psychology, p. 17
psychodynamic psychology, p. 18
social-cultural psychology, p. 18
testing effect, p. 20
SQ3R, p. 20
psychometrics, p. 24

basic research, p. 24

developmental psychology, p. 24

educational psychology, p. 24

personality psychology, p. 24

social psychology, p. 24

applied research, p. 24

industrial-organizational (I/O) psychology, p. 24

human factors psychology, p. 24

counseling psychology, p. 25

clinical psychology, p. 25

psychiatry, p. 25

community psychology, p. 25

KEY CONTRIBUTORS TO REMEMBER

Wilhelm Wundt, p. 7

G. Stanley Hall, p. 7

Edward Bradford Titchener, p. 7

William James, p. 8

Charles Darwin, p. 8

Mary Whiton Calkins, p. 8

Margaret Floy Washburn, p. 9

John B. Watson, p. 10

B. F. Skinner, p. 10

Sigmund Freud, p. 10

Carl Rogers, p. 11

Abraham Maslow, p. 11

Ivan Pavlov, p. 13

Jean Piaget, p. 13

Dorothea Dix, p. 25

For a complete list of key people throughout the text, see Appendix C, Psychological Science's Key Contributors, at the end of this text.

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. The debate about the relative contributions of biology and experience to human development is most often referred to as what?

a. Evolutionary analysis
b. Behaviorism
c. The cognitive revolution
d. The nature–nurture issue
e. Natural selection

2. Which of the following professionals focuses on the study of human flourishing and the attainment of a happy, meaningful life?

a. Positive psychologist
b. Evolutionary psychologist
c. Behavioral psychologist
d. Cognitive psychologist
e. Psychotherapist

3. Which psychological principle best explains why studying an hour per day for a week is more effective than one 7-hour study session?

a. Testing effect
b. Distributed practice
c. SQ3R
d. Retrieval practice effect
e. Psychometrics

4. Which of the following kinds of psychologists would most likely explore how we process and remember information?

a. Developmental

b. Biological
c. Social
d. Cognitive
e. Personality

5. According to the behavioral perspective, psychological science should be rooted in what?

a. Introspection
b. Observation
c. Cultural influences
d. Growth potential
e. Basic needs

6. Which of the following psychologists would most likely conduct psychotherapy?

a. Biological
b. Clinical
c. Industrial-organizational
d. Cognitive
e. Evolutionary

7. Which subfield or perspective is most interested in studying the link between mental activity and brain activity?

a. Humanistic psychology
b. Gestalt psychology
c. Cognitive neuroscience
d. Psychodynamic perspective
e. Evolutionary perspective

8. What was the main difference between the psychological thinking of Wilhelm Wundt and earlier philosophers who were also interested in thinking and behavior?

a. Wundt was German; earlier philosophers were American.
b. Wundt was the first professor from a major university interested in

psychology.
c. Wundt was the first scholar to call himself a psychologist.
d. Wundt used psychotherapy techniques established by Freud to examine the thinking and behavior of healthy individuals.
e. Wundt and his students gathered data about human thinking and behavior in a laboratory setting.

9. Which school of thought in psychology focused on the adaptive nature of thinking and how our consciousness evolves to meet our needs?

a. Functionalist
b. Structuralist
c. Behavioral
d. Humanistic
e. Psychodynamic

0. The study of our human potential for personal growth has been a focus of which psychological perspective?

a. Behavioral
b. Functionalist
c. Humanistic
d. Psychodynamic
e. Structuralist

1. Which of the following is the best example of applied research?

a. Investigating personality traits
b. Using psychological concepts to boost worker productivity
c. Experimenting with how people perceive different stimuli
d. Studying the changing abilities of children from ages 2 to 5
e. Exploring the neural changes that occur during adolescence

2. Self-reflective introspection about the elements of experience best describes a technique used by which school of thought in psychology?

a. Functionalists
b. Empiricists

c. Structuralists
d. Behaviorists
e. Humanists

3. Which psychological perspective is most likely to focus on how our interpretation of a situation affects how we react to it?

a. Psychodynamic
b. Biological
c. Social-cultural
d. Evolutionary
e. Cognitive

4. The science of behavior and mental processes is the definition of which field of study?

a. Philosophy
b. Cognitive neuroscience
c. Basic research
d. Psychology
e. Applied research

Free-Response Questions

1. Arianna is nervous around large crowds and often leaves social situations such as school dances and parties because she feels like she might have a panic attack. Her father died when she was a young girl, but she still often has nightmares about his death. Arianna enjoys school. She generally receives good grades and appreciates the positive feedback from her teachers, which further encourages her to improve her academic skills.

Explain how each of the seven main theoretical perspectives in psychology would explain Arianna's behavior.

Rubric for Free Response Question 1

1 point: The *biological approach* would attribute Arianna's nervousness to brain chemistry, hormones, or genetic influences. Page 17

1 point: The *evolutionary approach* would explore how avoiding social crowds might have been a survival advantage for early humans, such as by reducing exposure to germs and violence. Page 17

1 point: The *psychodynamic approach* would examine Arianna's early life and how she dealt with losing her father, focusing on Arianna's childhood experiences and unconscious anxieties. Page 18

1 point: The *behavioral approach* would look at what Arianna has learned in the past through rewards and punishments. She may have had a negative experience in a large group in the past and as a result has learned to avoid social gatherings. Page 17

1 point: The *cognitive approach* would focus on examining how Arianna perceives situations. Her interpretation of social situations may impact the outcome. Page 17

1 point: The *humanistic approach* would look at how Arianna's environment may have hindered growth and self-fulfillment. Page 17

1 point: The *social-cultural approach* would examine how interactions within the cultures Arianna belongs to influence her expectations about social situations. If her family or other cultural influences encourage her to attend social functions, that might influence her to continue to try attending those kinds of events. Page 18

2. Jacob's parents are encouraging him not to major in psychology because they worry he might not want to spend his life around mentally ill people. Help Jacob explain to his parents that psychologists do other types of work, by describing the specific focuses of each of the following types of psychologists:

- Educational psychologists
- Industrial-organizational psychologists

- Forensic psychologists
- Community psychologists

(4 points)

UNIT II Research Methods: Thinking Critically With Psychological Science

William Taufic/Corbis Documentary/Getty Images

MODULES

4 The Need for Psychological Science

5 The Scientific Method and Description

6 Correlation and Experimentation

7 Research Design and Ethics in Psychology

8 Statistical Reasoning in Everyday Life

In a difficult moment—after an argument with a loved one, a social embarrassment, or a bad grade—to whom do you turn? For advice and comfort, we often turn to friends and family, or search online. Psychology can also shed insight. Psychologists start with the questions that intrigue all of us: How can we be happier, healthier, and more successful? What can we do to improve our relationships? Why do people act and think as they do? But as a *science*, psychology does more than speculate: It uses research to separate uninformed opinions from examined conclusions.

▶ **Unit II Overview Video**

Module **4 The Need for Psychological Science**

LEARNING TARGET

4-1 Explain how hindsight bias, overconfidence, and the tendency to perceive order in random events illustrate why science-based answers are more valid than those based on common sense.

4-1 How do hindsight bias, overconfidence, and the tendency to perceive order in random events illustrate why science-based answers are more valid than those based on common sense?

Some people suppose that psychology is mere common sense—documenting and dressing in jargon what people already know: "You get paid for using fancy methods to prove what my grandmother knows?" Indeed, Grandma is often right. As the baseball great Yogi Berra (1925–2015) once said, "You can observe a lot by watching." (We have Berra to thank for other gems, such as "Nobody goes there any more—it's too crowded," and "If the people don't want to come out to the ballpark, nobody's gonna stop 'em.") Because we're all behavior watchers, it would be surprising if many of psychology's findings had *not* been foreseen. Many people believe that love breeds happiness, for example, and they are right (we have what Module 40 calls a deep "need to belong").

But sometimes Grandma's common sense, informed by countless casual observations, is wrong. In many other modules, we will see how research has overturned popular ideas—that familiarity breeds contempt, that dreams predict the future, and that most of us use only 10 percent of our brain. We will also see how research has surprised us with discoveries about how the brain's chemical messengers control our moods and memories, about other animals' abilities, and about the effects of stress on our capacity to fight disease.

Other things seem like commonsense truth only because we so often hear them repeated. Mere repetition of statements—whether true or false—makes them easier to process and remember, and thus more true-seeming (Dechêne et al., 2010; Fazio et al., 2015). Easy to remember misconceptions ("Vitamin C prevents the common cold") can therefore overwhelm hard truths. This power of familiar, hard-to-erase falsehoods is a lesson well known to political manipulators and kept in mind by critical thinkers.

> “*Those who trust in their own wits are fools.*”
>
> *Proverbs 28:26*

Three roadblocks to critical thinking—*hindsight bias, overconfidence*, and *perceiving patterns in random events*—help illustrate why we cannot rely solely on common sense.

Did We Know It All Along? Hindsight Bias

Consider how easy it is to draw the bull’s eye *after* the arrow strikes. After a dating couple breaks up, their friends say, “they were not a good match.” After the football game, we credit the coach if a “gutsy play” wins the game, and fault the coach for the same “stupid play” if it doesn’t. After a war or an election, its outcome usually seems obvious. Although history may therefore seem like a series of inevitable events, the actual future is seldom foreseen. No one’s diary recorded, “Today the Hundred Years War began.”

> “*Life is lived forwards, but understood backwards.*”
>
> *Philosopher Søren Kierkegaard, 1813–1855*

This **hindsight bias** (also known as the *I-knew-it-all-along phenomenon*) is easy to demonstrate by giving half the members of a group some purported psychological finding and giving the other half an opposite result. Tell the first group, for example: “Psychologists have found that separation weakens romantic attraction. As the saying goes, ‘Out of sight, out of mind.’” Ask them to imagine why this might be true. Most people can, and after explaining it nearly all will then view this true finding as unsurprising.

hindsight bias

the tendency to believe, after learning an outcome, that one would have foreseen it. (Also known as the *I-knew-it-all-along phenomenon.*)

> “*Anything seems commonplace, once explained.*”
>
> *Dr. Watson to Sherlock Holmes*

Everett Collection/Newscom

Hindsight bias When drilling its Deepwater Horizon oil well in 2010, BP employees took shortcuts and ignored warning signs, without intending to harm the environment or their company‘s reputation. *After* the resulting Gulf oil spill, with the benefit of 20/20 hindsight, the foolishness of those judgments became obvious.

Tell the second group the opposite: “Psychologists have found that separation strengthens romantic attraction. As the saying goes, ‘Absence makes the heart grow fonder.’” People given this untrue result can also easily imagine it, and most will also see it as unsurprising. When opposite findings both seem like common sense, there is a problem.

Such errors in people’s recollections and explanations show why we need psychological research. It’s not that common sense is usually wrong. Rather, common sense describes, after the fact, what *has* happened better than it predicts what *will* happen.

More than 800 scholarly papers have shown hindsight bias in people young and old from across the world (Roese & Vohs, 2012). As physicist Niels Bohr reportedly jested, “Prediction is very difficult, especially about the future.”

Overconfidence

We humans tend to think we know more than we do. Asked how sure we are of our answers to factual questions *(Is Boston north or south of Paris?)*, we tend to be more confident than correct.[1] Or consider these three anagram solutions (from Goranson, 1978):

WREAT → WATER

ETRYN → ENTRY

GRABE → BARGE

FYI

Fun anagram solutions from Wordsmith (wordsmith.org):

Snooze alarms = Alas! No more z’s

Dormitory = dirty room

Slot machines = cash lost in ’em

About how many seconds do you think it would have taken you to unscramble each of these? Did hindsight influence you? Knowing the answers tends to make us overconfident. (Surely the solution would take only 10 seconds or so?) In reality, the average problem solver spends 3 minutes, as you also might, given a similar anagram without the solution: OCHSA.[2]

AP® EXAM TIP

Multiple-choice questions on the AP® exam sometimes test your knowledge of “media myths.” Pay particular attention when psychological findings run counter to “common sense.”

Are we any better at predicting social behavior? Psychologist Philip Tetlock (1998, 2005) collected more than 27,000 expert predictions of world events, such as the future of South Africa or whether Quebec would separate from Canada. His repeated finding: These predictions, which experts made with 80 percent confidence on average, were right less than 40 percent of the time. Nevertheless, even those who erred maintained their confidence by noting they were “almost right”: “The Québécois separatists *almost* won the secessionist referendum.”

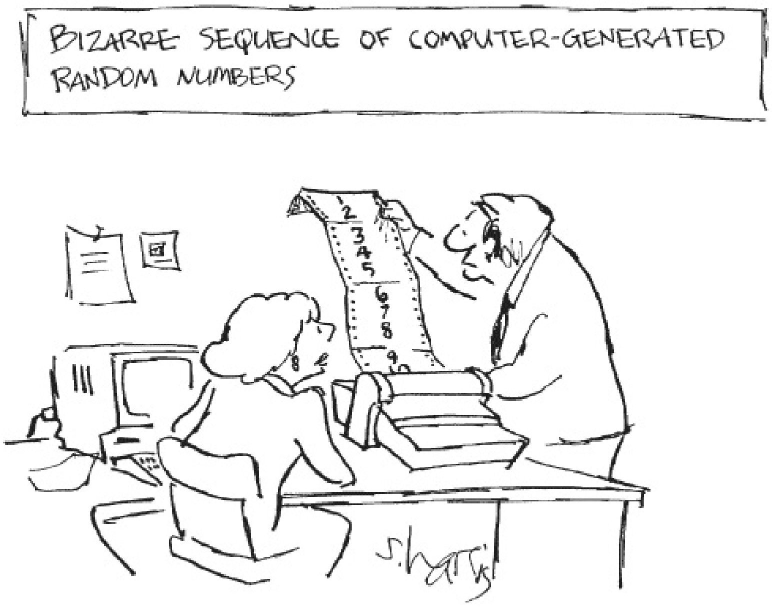
Perceiving Order in Random Events

For most people, a random, unpredictable world is unsettling (Tullett et al., 2015). We therefore have a built-in eagerness to make sense of our world. People may see a face on the Moon, hear satanic messages in music, perceive the Virgin Mary's image on a grilled cheese sandwich. Even in random data, we often find patterns, because—here's a curious fact of life—*random sequences often don't look random* (Falk, R. et al., 2009; Nickerson, 2002, 2005). Flip a coin 50 times and you will likely be surprised at the streaks of heads or tails—much like supposed "hot" and "cold" streaks in basketball shooting and baseball hitting. In actual random sequences, patterns and streaks (such as repeating digits) occur more often than people expect (Oskarsson et al., 2009). That also makes it hard for people to generate random-like sequences. When embezzlers try to simulate random digits when deciding how much to steal, their nonrandom patterns can alert fraud experts (Poundstone, 2014).

> *Overconfidence in history:*
>
> “ *We don't like their sound. Groups of guitars are on their way out.* ”
>
> *Decca Records, in turning down a contract with the Beatles in 1962*
>
> “ *Computers in the future may weigh no more than 1.5 tons.* ”
>
> *Popular Mechanics, 1949*
>
> “ *The telephone may be appropriate for our American cousins, but not here,*
>
> *because we have an adequate supply of messenger boys.* ”
>
> *British expert group evaluating the invention of the telephone*

Some happenings, such as winning a lottery twice, seem so extraordinary that we find it difficult to conceive an ordinary, chance-related explanation. "But with a large enough sample, any outrageous thing is likely to happen," noted statisticians Persi Diaconis and Frederick

Mosteller (1989). An event that happens to but 1 in 1 billion people every day occurs about 7 times a day, more than 2500 times a year.


BIZARRE SEQUENCE OF COMPUTER-GENERATED RANDOM NUMBERS
1
2
3
4
5
6
7
8
9
10
S. Harris

© 1990 by Sidney Harris/American Scientist magazine.

Bizarre-looking, perhaps. But actually no more unlikely than any other number sequence.

The point to remember: Hindsight bias, overconfidence, and our tendency to perceive patterns in random events tempt us to overestimate the value of commonsense thinking. But scientific inquiry can help us sift reality from illusion.

✓ Check Your Understanding

Ask Yourself

- Do you have a hard time thinking you may be overconfident? Could overconfidence be at work in that self-assessment?

Test Yourself

- Why, after friends start dating, do we often feel that we knew they were meant to be together?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 4 REVIEW

4-1 How do hindsight bias, overconfidence, and the tendency to perceive order in random events illustrate why science-based answers are more valid than those based on common sense?

- *Hindsight bias* (also called the “I-knew-it-all-along phenomenon”) is the tendency to believe, after learning an outcome, that we would have foreseen it.
- Overconfidence in our judgments results partly from our bias to seek information that confirms them.
- These tendencies, along with our eagerness to perceive patterns in random events, lead us to overestimate the weight of commonsense thinking. Although limited by the testable questions it can address, scientific inquiry can help us overcome such biases and shortcomings.

Multiple-Choice Questions

1. After the student council election, a friend tells you he could have guessed who would be elected president. What psychological phenomenon might this illustrate?

a. Common sense
b. Critical thinking
c. Hindsight bias
d. Overconfidence
e. Perceiving order in random events

2. While taking a standardized test with randomly scrambled answers, you notice that your last four answers have been “c.” Which of the following is true concerning the probability of the next answer being “c”?

a. It is higher. Once a streak begins, it is likely to last for a while.

b. It is lower. Since answers are distributed randomly, “c” answers become less common.
c. It is unaffected by previous answers. It is as likely to be “c” as any other answer.
d. You should check your previous answers. Four “c’s” in a row is impossible.
e. It is higher. Test constructors trick students by keeping the same answer many times in a row.

3. The tendency to exaggerate the correctness or accuracy of our beliefs and predictions is called

a. hindsight bias.
b. overconfidence.
c. critical thinking.
d. skepticism.
e. reliability.

4. Which of the following is an example of hindsight bias?

a. Armend is certain that electric cars will represent 80 percent of vehicles in 20 years and only reads research studies that support his hypothesis.
b. Liza underestimates how much time it will take her to finish writing her college application essays and as a result fails to meet an important deadline.
c. Experts predicting world events with 80 percent confidence turned out to be correct less than 40 percent of the time.
d. Alliyah, after reading a definition on one of her flashcards, turns the card over to see the term and then tells herself she knew what the answer was all along.
e. Dr. Grace overestimates how effectively her new treatment method works because she fails to seek out any evidence refuting her theory.

Practice FRQs

1. Elena won the lottery last night. Afterward, she told her friends that she knew she was going to win. Her friends think that she is so lucky because she won the lottery last year as well. Explain how hindsight bias and the tendency to perceive patterns in random events apply to Elena's winnings.

Answer

1 point: Hindsight bias: Elena knew today that she would win the lottery because she did. If she had not won, she would not remember the "feeling" that she would win. Page 38

1 point: Pattern in random events: Elena's winnings are unconnected. The odds of winning make it seem like a person is "lucky" if they win, but the odds of winning the lottery twice are not that unrealistic when odds of winning are spread out across an entire population. Page 40

2. A local basketball team has won three championships in a row and is on a winning streak going into the final game. Explain how their fans might use the following to explain a loss in the final game:

- Hindsight bias
- Overconfidence
- The tendency to perceive patterns in random events

(3 points)

Module 5 The Scientific Method and Description

LEARNING TARGETS

- 5-1 Describe how theories advance psychological science.
- 5-2 Explain how psychologists use case studies, naturalistic observations, and surveys to observe and describe behavior, and why random sampling is important.

The Scientific Method

At the foundation of all science is a scientific attitude that combines *curiosity*, *skepticism*, and *humility* (see Module 1). Psychologists arm their scientific attitude with the *scientific method*—a self-correcting process for evaluating ideas with observation and analysis. Psychological science welcomes hunches and plausible-sounding theories. And it puts them to the test. If a theory works—if the data support its predictions—so much the better for that theory. If its predictions fail, the theory gets revised or rejected.

Constructing Theories

Flip It Video: Operational Definitions

5-1 How do theories advance psychological science?

Chatting with friends and family, we often use *theory* to mean “mere hunch.” Someone might, for example, discount evolution as “only a theory”—as if it were mere speculation. In science, a **theory** *explains* behaviors or events by offering ideas that *organize* observations. By using deeper principles to organize isolated facts, a theory summarizes and simplifies. As we connect the observed dots, a coherent picture emerges.

theory

an explanation using an integrated set of principles that organizes observations and predicts behaviors or events.

AP® EXAM TIP

As you read this module, keep in mind that the scientific method is a set of principles and procedures, not a list of facts. You will be expected to understand how the science of psychology is done, not just what it has discovered. The

AP® exam frequently asks questions regarding research design in the multiple-choice and free-response sections.

A theory of how sleep affects memory, for example, helps us organize countless sleep-related observations into a short list of principles. Imagine that we observe over and over that people with good sleep habits tend to answer questions correctly in class and do well at test time. We might therefore theorize that sleep improves memory. So far so good: Our principle neatly summarizes a list of observations about the effects of a good night's sleep.

Yet no matter how reasonable a theory may sound—and it does seem reasonable to suggest that sleep boosts memory—we must put it to the test. A good theory produces testable *predictions*, called **hypotheses.** Such predictions specify what results would support the theory and what results would disconfirm it. To test our theory about sleep effects on memory, our hypothesis might be that when sleep deprived, people will remember less from the day before. To test that hypothesis, we might assess how well people remember course materials they studied either before a good night's sleep or before a shortened night's sleep (**Figure 5.1**). The results will either support our theory or lead us to revise or reject it.

hypothesis

a testable prediction, often implied by a theory.

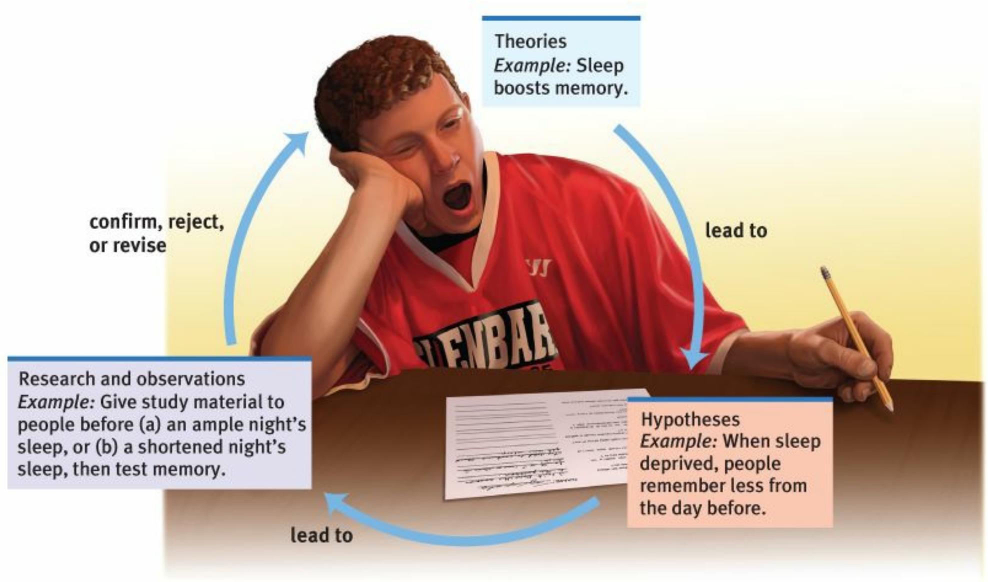

Theories
Example: Sleep boosts memory.
lead to
Hypotheses
Example: When sleep deprived, people remember less from the day before.
lead to
Research and observations
Example: Give study material to people before (a) an ample night's sleep, or (b) a shortened night's sleep, then test memory.
confirm, reject, or revise

Figure 5.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 5.1 The scientific method

A self-correcting process for asking questions and observing nature's answers.

Our theories can bias our observations. Having theorized that better memory springs from more sleep, we may see what we expect: We may perceive sleepy people's comments as less accurate. The urge to see what we expect is ever-present, both inside and outside the laboratory, as when people's views of climate change influence their interpretation of local weather events.

As a check on their biases, psychologists report their research with precise, measurable **operational definitions** of procedures and concepts. *Sleep deprived,* for example, may be defined as "X hours less" than the person's natural sleep. Using these carefully worded statements, others can **replicate** (repeat) the original observations with different participants, materials, and circumstances. If they get similar results, confidence in the finding's reliability grows. The first study of hindsight bias, for example, aroused psychologists' curiosity. Now, after many successful replications with differing people and questions, we feel sure of the phenomenon's power. Replication is confirmation. And lack of replication may enable us to revise our understanding.

operational definition

a carefully worded statement of the exact procedures (operations) used in a research study. For example, *human intelligence* may be operationally defined as what an intelligence test measures.

replication

repeating the essence of a research study, usually with different participants in different situations, to see whether the basic finding can be reproduced.

In the end, our theory will be useful if it (1) *organizes* observations, and (2) implies *predictions* that anyone can use to check the theory or to derive practical applications. (Does people's sleep predict their retention?) Eventually, our research may (3) stimulate further research that leads to a revised theory that better organizes and predicts. Or, our research may be replicated and supported by similar findings. (This has been the case for sleep and memory studies, as you will see in Module 24.)

> “*Failure to replicate is not a bug; it is a feature. It is what leads us along the path—the wonderfully twisty path—of scientific discovery.*”
>
> *Lisa Feldman Barrett, “Psychology Is Not in Crisis,” 2015*

As we will see next, we can test our hypotheses and refine our theories in several ways.

- *Descriptive* methods describe behaviors, often by using case studies, surveys, or naturalistic observations.
- *Correlational* methods associate different factors, or *variables*. (You'll see the word *variable* often in descriptions of research. It refers to anything that contributes to a result.)
- *Experimental* methods manipulate variables to discover their effects.

To think critically about popular psychology claims, we need to understand the strengths and weaknesses of these methods and the conclusions they allow.

✓ Check Your Understanding

Ask Yourself

- Will what you’ve learned about theories and replication change the way you will read about research results, such as in your news feed?

Test Yourself

- What does a good theory do?
- Why is replication important?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Description

5-2 How do psychologists use case studies, naturalistic observations, and surveys to observe and describe behavior, and why is random sampling important?

The starting point of any science is description. In everyday life, we all observe and describe people, often drawing conclusions about why they think, feel, and act as they do. Professional psychologists do much the same, though more objectively and systematically, through

- *case studies* (in-depth analyses of individuals or groups).
- *naturalistic observations* (recording the natural behavior of many individuals).
- *surveys* and interviews (asking people questions).

The Case Study

Among the oldest research methods, the **case study** examines one individual or group in depth in the hope of revealing things true of us all. Some examples:

- *Brain damage.* Much of our early knowledge about the brain came from case studies of individuals who suffered particular impairments after damage to a certain brain region.
- *Children's minds.* Jean Piaget taught us about children's thinking after carefully observing and questioning only a few children.
- *Animal intelligence.* Studies of various animals, including only a few chimpanzees, have revealed their capacity for understanding and language.

case study

a descriptive technique in which one individual or group is studied in depth in the hope of revealing universal principles.

> “ *‘Well my dear,’ said Miss Marple, ‘human nature is very much the same everywhere, and of course, one has opportunities of observing it at closer quarters in a village’.* ”
>
> *Agatha Christie, The Tuesday Club Murders, 1933*

Intensive case studies are sometimes very revealing, and they often suggest directions for further study.

But atypical individual cases may mislead us. Both in our everyday lives and in science, unrepresentative information can lead to mistaken judgments and false conclusions. Indeed, anytime a researcher mentions a finding *(Smokers die younger: 95 percent of men over 85 are nonsmokers),* someone is sure to offer a contradictory anecdote *(Well, I have an uncle who smoked two packs a day and lived to be 89).* Dramatic stories and personal experiences (even psychological case examples) command our attention and are easily remembered. Journalists understand that, and often begin their articles with compelling stories. Stories move us. But stories can mislead. Which of the following do you find more memorable? (1) “In one study of 1300 dream reports concerning a kidnapped child, only 5 percent correctly envisioned the child as dead” (Murray & Wheeler, 1937). (2) “I know a man who dreamed his sister was in a car accident, and two days later she died in a head-on collision!” Numbers can be numbing, *but the plural of anecdote is not evidence.* A single story of someone who supposedly changed from gay to straight is not evidence that sexual orientation is a choice. As psychologist Gordon Allport (1954, p. 9) said, “Given a thimbleful of [dramatic] facts we rush to make generalizations as large as a tub.”

Skye Hohmann/Alamy

Freud and Little Hans Sigmund Freud's case study of 5-year-old Hans' extreme fear of horses led Freud to his theory of childhood sexuality. He conjectured that Hans felt unconscious desire for his mother, feared castration by his rival father, and then transferred this fear into his phobia about being bitten by a horse. As Modules 55 and 56 will explain, today's psychological science discounts Freud's theory of childhood sexuality but does agree that much of the human mind operates outside our conscious awareness.

The point to remember: Individual cases can suggest fruitful ideas. What's true of all of us can be glimpsed in any one of us. To find those general truths, we must employ other research methods.

✓ Check Your Understanding

Ask Yourself

- From your observations of people, can you think of a "case study" that has taught you something about people in general?

Test Yourself

- We cannot assume that case studies always reveal general principles that apply to all of us. Why not?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Naturalistic Observation

MICHAEL NICHOLS/National Geographic Creative

A natural observer “Observations, made in the natural habitat, helped to show that the societies and behavior of animals are far more complex than previously supposed,” chimpanzee observer Jane Goodall noted (1998).

A second descriptive method records behavior in natural environments. These **naturalistic observations** range from watching chimpanzee societies in the jungle, to videotaping and analyzing parent-child interactions in different cultures, to recording racial differences in students’ self-seating patterns in a school lunchroom.

naturalistic observation

a descriptive technique of observing and recording behavior in naturally occurring situations without trying to manipulate or control the situation.

Naturalistic observation has mostly been “small science”—science that can be done with pen and paper rather than fancy equipment and a big budget (Provine, 2012). But new technologies, such as smart-phone apps, body-worn sensors, and social media, are enabling “big data” observations. Using such tools, researchers can track people’s location, activities, and opinions—without interference. The billions of people on Facebook, Twitter, and Google have also created a huge new opportunity for big-data naturalistic observation. One research team studied the ups and downs of human moods by counting positive and negative words in 504 million

Twitter messages from 84 countries (Golder & Macy, 2011). As **Figure 5.2** shows, people seem happier on weekends, shortly after waking, and in the evenings. (Are late Saturday evenings often a happy time for you, too?) Another study found that the proportion of negative emotion (especially anger-related) words in 148 million tweets from 1347 U.S. counties predicted the counties' heart disease rates. Moreover, it did so even better than other predictors such as smoking and obesity rates (Eichstaedt et al., 2015).

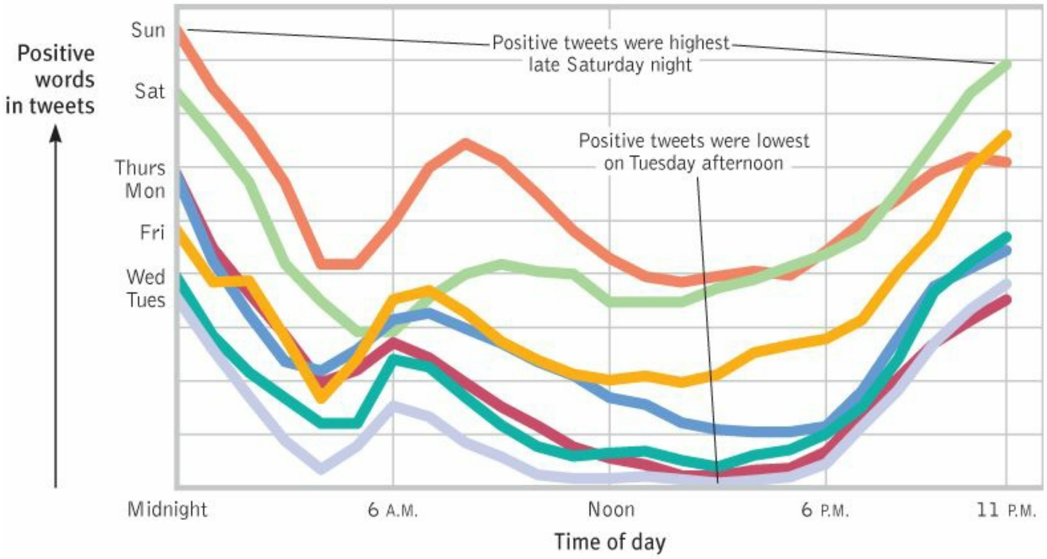


Figure 5.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Golder & Macy, 2011.

Figure 5.2 Twitter message moods, by time and by day

This illustrates how, without knowing anyone's identity, big data enable researchers to study human behavior on a massive scale. It now is also possible to associate people's moods with, for example, their locations or with the weather, and to study the spread of ideas through social networks.

Like the case study, naturalistic observation does not *explain* behavior. It *describes* it. Nevertheless, descriptions can be revealing. We once thought, for example, that only humans use tools. Then naturalistic observation revealed that chimpanzees sometimes insert a stick in a termite mound and withdraw it, eating the stick's load of termites. Such unobtrusive naturalistic observations paved the way for later studies of animal thinking, language, and emotion, which further expanded our understanding of our fellow animals. Thanks to researchers’ observations, we know that chimpanzees and baboons use deception: Psychologists repeatedly saw one young baboon pretending to have been attacked by another as a tactic to get its mother to drive the other baboon away from its food (Whiten & Byrne, 1988).

Naturalistic observations also illuminate human behavior. Here are three findings you might enjoy:

- *A funny finding.* We humans laugh 30 times more often in social situations than in solitary situations (Provine, 2001). (Have you noticed how seldom you laugh when alone?)
- *Sounding out students.* What, really, are college psychology students saying and doing during their everyday lives? To find out, Matthias Mehl and his colleagues (2010) equipped 79 such students with electronic recorders. Using this *experience sampling method*, the researchers then eavesdropped on more than 23,000 half-minute life slices of students’ waking hours. Was happiness related to having simple talks or deeply involved conversations? The happiest participants avoided small talk and embraced meaningful conversations. Happy people would also rather talk than tweet. Does that surprise you?
- *Culture and the pace of life.* Naturalistic observation also enabled Robert Levine and Ara Norenzayan (1999) to compare the pace of life —walking speed, accuracy of public clocks, and so forth—in 31 countries. Their conclusion: Life is fastest paced in Japan and Western Europe, and slower paced in economically less-developed countries.

Courtesy of Matthias Mehl

An EAR for naturalistic observation Psychologists Matthias Mehl and James Pennebaker have used electronically activated recorders (EARs) to sample naturally occurring slices of daily life. What are the advantages and disadvantages of naturalistic observation, such as Mehl and his colleagues used in this study?[1]

Naturalistic observation offers interesting snapshots of everyday life, but it does so without controlling for all the factors that may influence behavior. It's one thing to observe the pace of life in various places, but another to understand what makes some people walk faster than others. Nevertheless, descriptions can be revealing: The starting point of any science is description.

The Survey

A **survey** looks at many cases in less depth, asking people to report their behavior or opinions. Questions about everything from cell-phone use to political opinions are put to the public. In recent surveys:

- half of all Americans reported experiencing more happiness and enjoyment than worry and stress on the previous day (Gallup, 2010).
- 1 in 5 people across 22 countries report believing that alien beings have

come to Earth and now walk among us disguised as humans (Ipsos, 2010).
- 68 percent of all humans—some 5 billion people—say that religion is important in their daily lives (Diener et al., 2011).

survey

a descriptive technique for obtaining the self-reported attitudes or behaviors of a particular group, usually by questioning a representative, *random sample* of the group.

But asking questions is tricky, and the answers often depend on how questions are worded and how respondents are chosen.

Wording Effects

Even subtle changes in the order or wording of questions can have major effects. People are more approving of “aid to the needy” than of “welfare,” of “not allowing” televised pornography than of “censoring” it, of “gun safety” laws than of “gun control” laws, and of “revenue enhancers” than of “taxes.” Because wording is such a delicate matter, critical thinkers will reflect on how the phrasing of a question might affect people’s expressed opinions.

Random Sampling

In everyday thinking, we tend to generalize from samples we observe, especially vivid cases. Given (a) a statistical summary of auto owners’ evaluations of their car make and (b) the vivid comments of two frustrated owners, our impression may be influenced as much by the two unhappy owners as by the many more summarized evaluations. The temptation to succumb to the **sampling bias**—*to* generalize from a few vivid but unrepresentative cases—is nearly irresistible.

sampling bias

a flawed sampling process that produces an unrepresentative sample.

It's often not possible to survey the whole group. So how do you obtain a *representative sample*—say, of the students at your high school? How could you choose a sample that would represent the student **population,** the whole group you want to study and describe? Typically, you would seek a **random sample,** in which every person in the entire group has an equal chance of participating. You might number the names in the general student listing and then use a random number generator to pick your survey participants. (Sending each student a questionnaire wouldn't work, because the conscientious people who returned it would not be a random sample.) Large representative samples are better than small ones, but a smaller representative sample of 100 is better than a larger unrepresentative sample of 500.

population

all those in a group being studied, from which samples may be drawn. (*Note:* Except for national studies, this does *not* refer to a country's whole population.)

random sample

a sample that fairly represents a population because each member has an equal chance of inclusion.

FYI

With very large samples, estimates become quite reliable. *E* is estimated to represent 12.7 percent of the letters in written English. *E,* in fact, is 12.3 percent of the 925,141 letters in Melville's *Moby-Dick,* 12.4 percent of the 586,747 letters in Dickens' *A Tale of Two Cities,* and 12.1 percent of the 3,901,021 letters in 12 of Mark Twain's works (*Chance News,* 1997).

Political pollsters sample voters in national election surveys just this way. Using some 1500 randomly sampled people, drawn from all areas of a country, they can provide a remarkably accurate snapshot of the nation’s opinions. Without random sampling (also called *random selection*), large samples—including unrepresentative call-in or website polls—often give misleading results.

The point to remember: Before accepting survey findings, think critically. Consider the sample. The best basis for generalizing is from a representative sample. You cannot compensate for an unrepresentative sample by simply adding more people.

✓ Check Your Understanding

Ask Yourself

- Can you recall a misleading survey you have experienced or read about? What survey principles did it violate?

Test Yourself

- What is an unrepresentative sample, and how do researchers avoid it?
- What are some strengths and weaknesses of the three different methods psychologists use to describe behavior—case studies, naturalistic observation, and surveys?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 5 REVIEW

5-1 How do theories advance psychological science?

- Psychological *theories* are explanations that apply an integrated set of principles to organize observations and generate *hypotheses* —predictions that can be used to check the theory or produce practical applications of it. By testing their hypotheses, researchers can confirm, reject, or revise their theories.
- To enable other researchers to *replicate* the studies, researchers report them using precise *operational definitions* of their procedures and concepts. If others achieve similar results, confidence in the conclusion will be greater.

5-2 How do psychologists use case studies, naturalistic observations, and surveys to observe and describe behavior, and why is random sampling important?

- Description methods, which include *case studies, naturalistic observations,* and *surveys,* show us what can happen, and they may offer ideas for further study.
- The best basis for generalizing about a *population* is a representative sample; in a *random sample,* every person in the entire population being studied has an equal chance of participating.
- Descriptive methods describe but do not *explain* behavior, because these methods do not control for the many variables that can affect behavior.

Multiple-Choice Questions

1. Why is an operational definition necessary when reporting research findings?

   a. An operational definition allows others to replicate the study.

b. An operational definition provides more context and includes many examples of the concept described.
c. An operational definition is easier to translate into multiple languages than a dictionary definition.
d. An operational definition uses more scientific language than a dictionary definition.
e. An operational definition is not necessary since a dictionary definition will work as well for replication.

2. A researcher looking for gender differences in 3-year-olds observes a preschool class and records how many minutes children of each gender play with dolls. She then compares the two sets of numbers. What type of descriptive research is she conducting?

a. Case study
b. Experiment
c. Random sample method
d. Naturalistic observation
e. Survey

3. Which of the following questions is best investigated by means of a survey?

a. Are people more likely to vote Republican or Democrat in the next election?
b. Are violent criminals genetically different from nonviolent criminals?
c. Does extra sleep improve memory?
d. What is the best study technique for AP® exams?
e. What role does exercise play in weight loss?

4. A testable prediction that drives research is known as a(n)

a. theory.
b. hypothesis.
c. operational definition.
d. guess.
e. random sample.

5. Researchers are interested in finding out if voters are more likely to vote for congressional candidates who have more pleasant facial expressions. Starting at a random point, the researchers contact every hundredth person on the voter list to ask about candidate facial expressions. Which method are the researchers using in choosing the people they will call?

a. Random sample
b. Periodic sample
c. Biased sample
d. Survey
e. Operational definition

6. An individual with an exceptional memory is identified. For any given date, she is capable of recalling major events, the weather, and what she did that day. What research method is being used if a psychologist conducts an in-depth investigation of this individual using questionnaires, brain scans, and memory tests?

a. Naturalistic observation
b. Survey
c. Interview
d. Case study
e. Theory method

7. Which of the following is most important when conducting survey research?

a. Choosing a representative sample
b. Choosing a large sample
c. Choosing a biased sample
d. Choosing a sample that includes every member of the population
e. Choosing a sample whose answers will likely support your hypothesis

Practice FRQs

1. A teacher wants to know if nightmares are more common than dreams. He asks volunteers from his second-period class to report how many dreams they had last week. He asks volunteers from his third-period class to report the number of nightmares they had last week. Describe two things wrong with the design of this study.

Answer (2 of the following):

1 point: There is no hypothesis stated. Page 42

1 point: In asking for volunteers, the teacher is taking a nonrandom sample that is probably not representative of the population of interest. Page 47

1 point: Neither "dreams" nor "nightmares" are operationally defined, so they might be interpreted differently by later researchers. Page 42

2. Dr. Cheema is interested in studying the prevalence of cheating on exams at her local high school. Describe one disadvantage of using each of the following research methods to study this topic:

- Case study
- Naturalistic observation
- Survey

(3 points)

Module **6 Correlation and Experimentation**

LEARNING TARGETS

- 6-1 Explain what it means when we say two things are correlated, and describe positive and negative correlations.
- 6-2 Discuss why correlations enable prediction but not cause-effect explanation.
- 6-3 Explain illusory correlations and regression toward the mean.
- 6-4 Describe the characteristics of experimentation that make it possible to isolate cause and effect.

Study finds that increased parental support for college results in lower grades” (Jaschik, 2013). “People with mental illness are more likely to be smokers” (Belluck, 2013).

What should we make of such news headlines? Do these correlations indicate that students would achieve more if their parents became less supportive, and that stopping smoking could produce better mental health? *No.* Read on.

Correlation

6-1 What does it mean when we say two things are correlated, and what are positive and negative correlations?

Describing behavior is a first step toward predicting it. Naturalistic observations and surveys often show us that one trait or behavior tends to coincide with another. In such cases, we say the two **correlate**. A statistical measure (the **correlation coefficient**) helps us figure how closely two things vary together, and thus how well either one *predicts* the other. Knowing how much aptitude test scores *correlate* with school success tells us how well the scores *predict* school success.

correlation

a measure of the extent to which two factors vary together, and thus of how well either factor predicts the other.

correlation coefficient

a statistical index of the relationship between two things (from −1.00 to +1.00).

Throughout this book, we will often ask how strongly two **variables** are related: For example, how closely related are the extraversion scores of identical twins? How well do intelligence test scores predict career achievement? How closely is stress related to disease? In such cases, **scatterplots** can be very revealing.

variable

anything that can vary and is feasible and ethical to measure.

scatterplot

a graphed cluster of dots, each of which represents the values of two variables. The slope of the points suggests the direction of the relationship between the two variables. The amount of scatter suggests the strength of the correlation (little scatter indicates high correlation).

Each dot in a scatterplot represents the values of two variables. The three scatterplots in **Figure 6.1** illustrate the range of possible correlations from a perfect positive to a perfect negative. (Perfect correlations rarely occur in the real world.) A correlation is positive if two sets of scores, such as for height and weight, tend to rise or fall together.

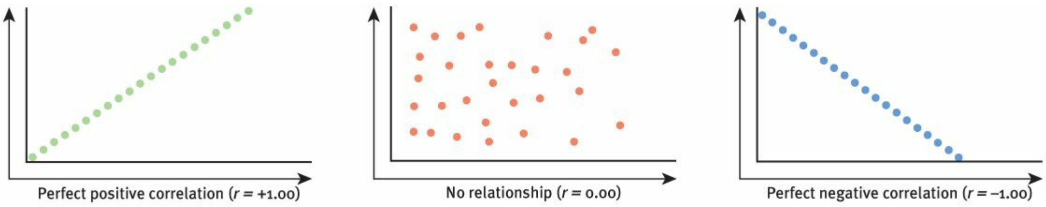

Perfect positive correlation ($r = +1.00$)
No relationship ($r = 0.00$)
Perfect negative correlation ($r = -1.00$)

Figure 6.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 6.1 Scatterplots, showing patterns of correlation

Correlation—abbreviated *r*—can range from +1.00 (scores for one variable increase in direct proportion to scores for another), to 0.00 (no relationship), to –1.00 (scores for one variable decrease precisely as scores rise for the other).

▶ **Flip it Video: Correlations**

Saying that a correlation is “negative” says nothing about its strength. A correlation is negative if two sets of scores relate inversely, one set going up as the other goes down. The correlation between standing people’s height and the distance from their head to the ceiling is strongly (perfectly, in fact) negative.

Statistics can help us see what the naked eye sometimes misses. To demonstrate this for yourself, try an imaginary project. You wonder if tall men are more or less easygoing, so you collect two sets of scores: men’s heights and men’s temperaments. You measure the heights of 20 men, and you have someone else independently assess their temperaments from 0 (extremely calm) to 100 (highly reactive).

AP® EXAM TIP

This is the first of several times in your psychology course that you will see something labeled as being positive or negative. We often think that if something is positive it is good and if it’s negative it’s bad. That is rarely the case in this course. Here, positive and negative refer only to the direction of the correlation. They say nothing about whether the relationship is desirable or not.

With all the relevant data right in front of you (Table 6.1), can you tell whether the correlation between height and reactive temperament is positive, negative, or close to zero?

TABLE 6.1 Height and Temperamental Reactivity of 20 Men

Person	Height in Inches	Temperament
1	80	75
2	63	66
3	61	60
4	79	90
5	74	60
6	69	42
7	62	42
8	75	60
9	77	81
10	60	39
11	64	48
12	76	69

13	71	72
14	66	57
15	73	63
16	70	75
17	63	30
18	71	57
19	68	84
20	70	39

Comparing the columns in Table 6.1, most people detect very little relationship between height and temperament. In fact, the correlation in this imaginary example is positive ($r = +0.63$), as we can see if we display the data as a scatterplot (**Figure 6.2**).

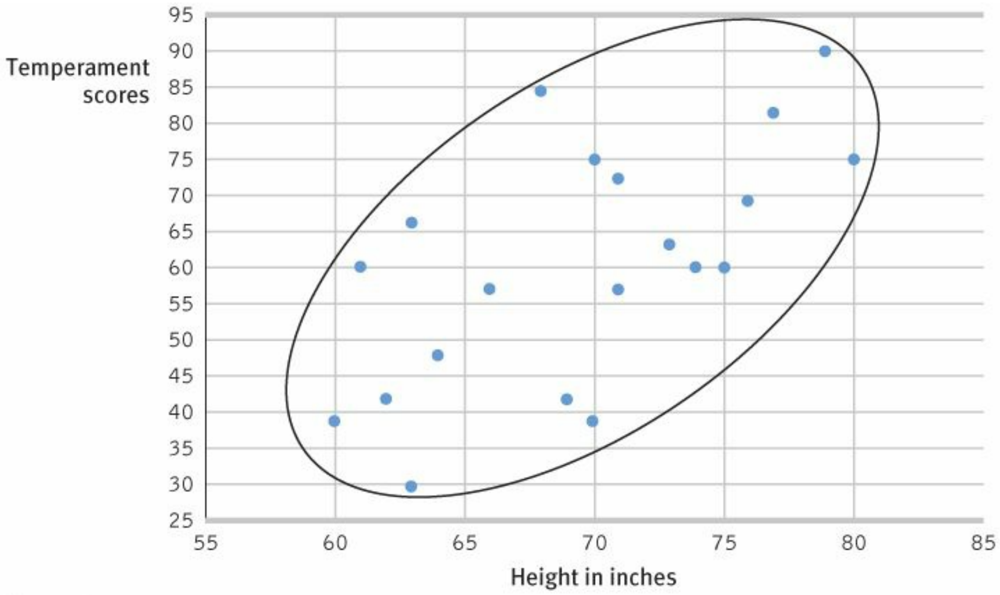


Figure 6.2
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Figure 6.2 Scatterplot for height and temperamental reactivity

This display of data from 20 imagined people (each represented by a data point) reveals an upward slope, indicating a positive correlation. The considerable scatter of the data indicates the correlation is much lower than +1.00.

If we fail to see a relationship when data are presented as systematically as in Table 6.1, how much less likely are we to notice them in everyday life? To see what is right in front of us, we sometimes need statistical illumination. We can easily see evidence of gender discrimination when given statistically summarized information about job level, seniority, performance, gender, and salary. But we often see no discrimination when the same information dribbles in, case by case (Twiss et al., 1989). See **Table 6.2** to test your understanding further.

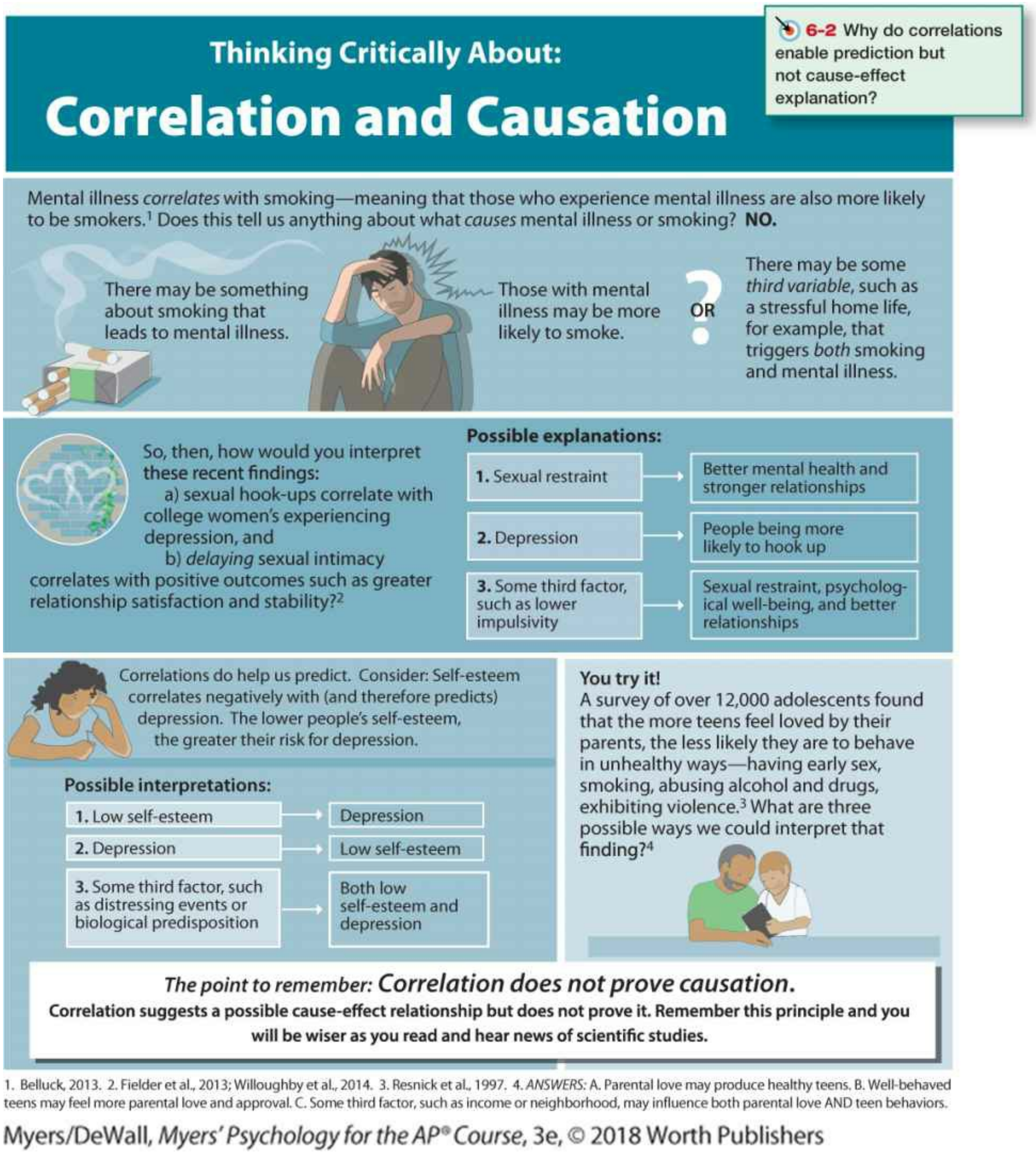
TABLE 6.2 Test Your Understanding of Correlation

Which of the following news reports are examples of a *positive* correlation, and which are examples of a *negative* correlation? (Check your answers in the footnotes.)

1. The more husbands viewed Internet pornography, the worse their marital relationships (Muusses et al., 2015). _______________
2. The less sexual content teens saw on TV, the less likely they were to have sex (Collins et al., 2004). __________
3. The longer babies were breast-fed, the greater their later academic achievement (Horwood & Ferguson, 1998). __________
4. The more income rose among a sample of poor families, the fewer psychiatric symptoms their children experienced (Costello et al., 2003). __________________

The point to remember: A correlation coefficient, which can range from −1.0 to +1.0, reveals the extent to which two things relate. The closer the score gets to −1 or +1, the stronger the correlation.

Although correlational research helpfully reveals relationships, it doesn’t *explain* them. See Thinking Critically About: Correlation and Causation.



6-2 Why do correlations enable prediction but not cause-effect explanation?

Thinking Critically About:

Correlation and Causation

Mental illness *correlates* with smoking—meaning that those who experience mental illness are also more likely to be smokers.[1] Does this tell us anything about what *causes* mental illness or smoking? **NO.**

There may be something about smoking that leads to mental illness.

Those with mental illness may be more likely to smoke.

OR

There may be some *third variable*, such as a stressful home life, for example, that triggers *both* smoking and mental illness.

So, then, how would you interpret these recent findings:
a) sexual hook-ups correlate with college women's experiencing depression, and
b) *delaying* sexual intimacy correlates with positive outcomes such as greater relationship satisfaction and stability?[2]

Possible explanations:

1. Sexual restraint → Better mental health and stronger relationships

2. Depression → People being more likely to hook up

3. Some third factor, such as lower impulsivity → Sexual restraint, psychological well-being, and better relationships

Correlations do help us predict. Consider: Self-esteem correlates negatively with (and therefore predicts) depression. The lower people's self-esteem, the greater their risk for depression.

Possible interpretations:

1. Low self-esteem → Depression

2. Depression → Low self-esteem

3. Some third factor, such as distressing events or biological predisposition → Both low self-esteem and depression

You try it!

A survey of over 12,000 adolescents found that the more teens feel loved by their parents, the less likely they are to behave in unhealthy ways—having early sex, smoking, abusing alcohol and drugs, exhibiting violence.[3] What are three possible ways we could interpret that finding?[4]

***The point to remember:* Correlation does not prove causation.**

Correlation suggests a possible cause-effect relationship but does not prove it. Remember this principle and you will be wiser as you read and hear news of scientific studies.

1. Belluck, 2013. 2. Fielder et al., 2013; Willoughby et al., 2014. 3. Resnick et al., 1997. 4. *ANSWERS:* A. Parental love may produce healthy teens. B. Well-behaved teens may feel more parental love and approval. C. Some third factor, such as income or neighborhood, may influence both parental love AND teen behaviors.

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FYI

A *New York Times* writer reported a massive survey showing that "adolescents whose parents smoked were 50 percent more likely than children of nonsmokers to report having had sex." He concluded (would you agree?) that the survey indicated a causal effect—that "to reduce the chances that their children will become sexually active at an early age" parents might "quit smoking" (O'Neil, 2002).

AP® EXAM TIP

Take note of how much emphasis is put on this idea: Correlation and association do not prove a cause-effect relationship. This has been on the AP® exam in the past.

Illusory Correlation and Regression Toward the Mean

6-3 What are illusory correlations, and what is regression toward the mean?

Correlations not only make visible the relationships we might otherwise miss, they also restrain our “seeing” nonexistent relationships. When we believe there is a relationship between two things, we are likely to notice and recall instances that confirm our belief. If we believe that dreams forecast actual events, we may notice and recall confirming instances more than disconfirming instances. The result is an **illusory correlation**.

illusory correlation
perceiving a relationship where none exists, or perceiving a stronger-than-actual relationship.

Nancy Brown/Getty Images

Correlation need not mean causation Length of marriage positively correlates with hair loss in men. Does this mean that marriage causes men to lose their hair (or that balding men make better husbands)?[5]

Illusory correlations can feed an illusion of control—that chance events are subject to our personal control. Gamblers, remembering their lucky rolls, may come to believe they can influence the roll of the dice by again throwing gently for low numbers and hard for high numbers. The illusion that uncontrollable events correlate with our actions is also fed by a statistical phenomenon called **regression toward the mean**. Average results are more typical than extreme results. Thus, after an unusual event, things tend to return toward their average level; extraordinary happenings tend to be followed by more ordinary ones.

regression toward the mean
the tendency for extreme or unusual scores or events to fall back (regress) toward the average.

The point may seem obvious, yet we regularly miss it: We sometimes attribute what may be a normal regression (the expected return to normal) to something we have done. Consider two examples:

- Students who score much lower or higher on an exam than they usually do are likely, when retested, to return to their average.
- Unusual ESP subjects who defy chance when first tested nearly always lose their "psychic powers" when retested.

Failure to recognize regression is the source of many superstitions and of some ineffective practices as well. After berating an employee for poorer-than-usual performance a manager may—when the employee regresses to normal—feel rewarded for the "tough love." After lavishing praise for an exceptionally fine performance, the manager may be disappointed when the employee's behavior again migrates back toward his or her average. Ironically, then, regression toward the average can mislead us into feeling rewarded after criticizing others and feeling punished after praising them (Tversky & Kahneman, 1974).

The point to remember: When a fluctuating behavior returns to normal, fancy explanations for why it does so are probably wrong. Regression toward the mean is probably at work.

> “*Once you become sensitized to it, you see regression everywhere.*”

Psychologist Daniel Kahneman (1985)

✓ Check Your Understanding

Ask Yourself

- Can you think of a popular media report you’ve read that confused correlation with causation?

Test Yourself

- You hear the school basketball coach telling her friend that she rescued her team’s winning streak by yelling at the players after an unusually bad first half. What is another explanation of why the team’s performance improved?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Experimentation

6-4 What are the characteristics of experimentation that make it possible to isolate cause and effect?

Happy are they, remarked the Roman poet Virgil, "who have been able to perceive the causes of things." How might psychologists sleuth out the causes in correlational studies, such as the correlation between breast feeding and intelligence?

Experimental Manipulation

Some researchers (not all) have found that breast-fed infants develop higher childhood intelligence scores than do bottle-fed infants—an average 3 IQ point difference in a review of 17 studies (Horta et al., 2015; von Stumm & Plomin, 2015; Walfisch et al., 2014). Moreover, the longer infants breast feed, the higher their later IQ scores (Jedrychowski et al., 2012; Victora et al., 2015).

What do such findings mean? Do the nutrients of mother's milk contribute to brain development? Or do smarter mothers have smarter children? (Breast-fed children tend to be healthier and higher achieving than other children. But their bottle-fed siblings, born and raised in the same families, tend to be similarly healthy and high achieving [Colen & Ramey, 2014].) Even big data from a million or a billion mothers and their offspring couldn't tell us. To find answers to such questions—to isolate cause and effect—researchers must **experiment**. Experiments enable researchers to isolate the effects of one or more factors by (1) *manipulating the factors of interest* and (2) *holding constant* ("*controlling*") *other factors*. To do so, they often create an **experimental group**, in which people receive the treatment, and a contrasting **control group** that does not receive the treatment.

experiment

a research method in which an investigator manipulates one or more factors (independent variables) to observe the effect on some behavior or mental process (the dependent variable). By *random assignment* of participants, the experimenter aims to control other relevant factors.

experimental group

in an experiment, the group exposed to the treatment, that is, to one version of the independent variable.

control group

in an experiment, the group *not* exposed to the treatment; contrasts with the experimental group and serves as a comparison for evaluating the effect of the treatment.

Earlier, we mentioned the place of random *sampling* in a well-done survey. Consider now the equally important place of *random assignment* in a well-done experiment. To minimize any preexisting differences between the two groups, researchers **randomly assign** people to the two conditions. Random assignment—whether with a random numbers table or flip of the coin—effectively equalizes the two groups. If one-third of the volunteers for an experiment can wiggle their ears, then about one-third of the people in each group will be ear wigglers. So, too, with age, attitudes, and other characteristics, which will be similar in the experimental and control groups. Thus, if the groups differ at the experiment’s end, we can surmise that the treatment had an effect. (Note the difference between random *sampling*—which creates a representative survey sample—and random *assignment*, which equalizes experimental groups.)

random assignment

assigning participants to experimental and control groups by chance, thus minimizing preexisting differences between the different groups.

To experiment with breast feeding, one research team randomly assigned some 17,000 Belarus newborns and their mothers either to a control group given normal pediatric care or to an experimental group that promoted breast feeding, thus increasing expectant mothers’ breast intentions (Kramer et al., 2008). At three months of age, 43 percent of the infants in the experimental group were being exclusively breast-fed, as were 6 percent in the control group. At age 6, when nearly 14,000 of the children were restudied, those who had been in the breast-feeding promotion group had intelligence test scores averaging six points higher than their control condition counterparts.

With parental permission, one British research team directly experimented with breast milk. They randomly assigned 424 hospitalized premature infants either to formula feedings or to breast-milk feedings (Lucas et al., 1992). Their finding: On intelligence tests taken at age 8, those nourished with breast milk scored significantly higher than those who were formula-fed. Breast was best.

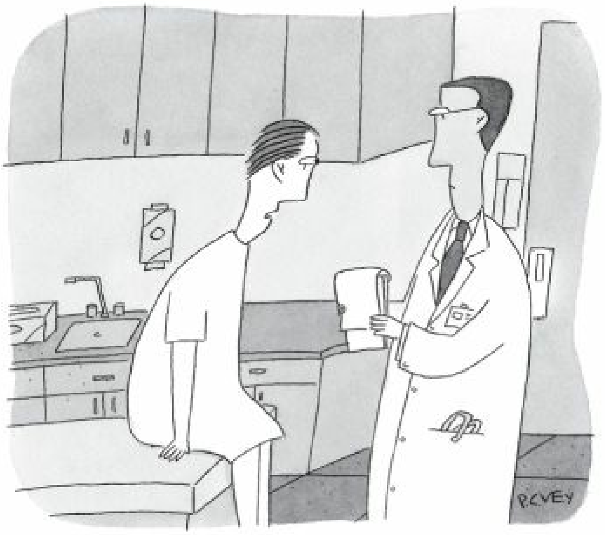
Lane Oatey/Getty Images

No single experiment is conclusive, of course. But randomly assigning participants to one feeding group or the other effectively eliminated all factors except nutrition. If a behavior (such as test performance) changes when we change an experimental variable (such as infant nutrition), then we infer the variable is having an effect.

The point to remember: Unlike correlational studies, which uncover naturally occurring relationships, an experiment manipulates a variable to determine its effect.

Procedures and the Placebo Effect

Consider, then, how we might assess therapeutic interventions. Our tendency to seek new remedies when we are ill or emotionally down can produce misleading testimonies. If three days into a cold we start taking zinc tablets and find our cold symptoms lessening, we may credit the pills rather than the cold naturally subsiding. In the 1700s, bloodletting *seemed* effective. People sometimes improved after the treatment; when they didn’t, the practitioner inferred the disease was too advanced to be reversed. So, whether or not a remedy is truly effective, enthusiastic users will probably endorse it. To determine its effect, we must control for other variables.



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“If I don’t think it’s going to work, will it still work?”

And that is precisely how new medications and new methods of psychological therapy are evaluated (Modules 72 and 73). Investigators randomly assign participants in these studies to research groups. One group receives a treatment (such as a medication). The other group receives a pseudotreatment—an inert *placebo* (perhaps a pill with no drug in it). The participants are often *blind* (uninformed) about what treatment, if any, they are receiving. If the study is using a **double-blind procedure,** neither the participants nor those who administer the drug and collect the data will know which group is receiving the treatment. Thus neither participants' or researchers' expectations can bias the results.

double-blind procedure

an experimental procedure in which both the research participants and the research staff are ignorant (blind) about whether the research participants have received the treatment or a placebo. Commonly used in drug-evaluation studies.

In double-blind studies, researchers can check a treatment's actual effects apart from the participants' and the staff's belief in its healing powers. Just *thinking* you are getting a treatment can boost your spirits, relax your body, and relieve your symptoms. This **placebo effect** is well documented in reducing pain, depression, and anxiety (Kirsch, 2010). Athletes have run faster when given a supposed performance-enhancing drug (McClung & Collins, 2007). Decaf-coffee drinkers have reported increased vigor and alertness—when they thought their brew had caffeine in it (Dawkins et al., 2011). People have felt better after receiving a phony mood-enhancing drug (Michael et al., 2012). And the more expensive the placebo, the more "real" it seems to us—a fake pill that costs $2.50 worked better than one costing 10 cents (Waber et al., 2008). To know how effective a therapy really is, researchers must control for a possible placebo effect.

placebo [pluh-SEE-bo; Latin for "I shall please"] effect

experimental results caused by expectations alone; any effect on behavior caused by the administration of an inert substance or condition, which the recipient assumes is an active agent.

✓ Check Your Understanding

Ask Yourself

- Can you think of a time when you may have been tricked by the placebo effect?

Test Yourself

- What measures do researchers use to prevent the placebo effect from confusing their results?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Independent and Dependent Variables

Flip It Video: Variables in Experiments

Here is a practical experiment: In a not yet published study, Victor Benassi and his colleagues gave college psychology students frequent in-class quizzes. Some items served merely as *review*—students were given questions with answers. Other *self-testing* items required students to actively produce the answers. When tested weeks later on a final exam, students did far better on material on which they had been tested (75 percent correct) rather than merely reviewed (51 percent correct). By a wide margin, testing beat restudy.

This simple experiment manipulated just one variable: the study procedure (reading answers versus self-testing). We call this experimental factor the **independent variable** because we can vary it *independently* of other factors, such as the students' memories, intelligence, and age. These other factors that can potentially influence a study's results are called **confounding variables.** Random assignment controls for possible confounding variables.

independent variable

in an experiment, the factor that is manipulated; the variable whose effect is being studied.

confounding variable

a factor other than the factor being studied that might influence a study's results.

Experiments examine the effect of one or more independent variables on some measurable behavior, called the **dependent variable** because it can vary *depending* on what takes place during the experiment. Both variables are given precise *operational definitions*, which specify the procedures that manipulate the independent variable (the review versus self-testing study method in this experiment) or measure the dependent variable (final exam performance). These definitions answer the “What do you mean?” question with a level of precision that enables others to replicate the study. (See **Figure 6.3** for the previously mentioned British breast-milk experiment’s design.)

dependent variable

in an experiment, the outcome that is measured; the variable that may change when the independent variable is manipulated.

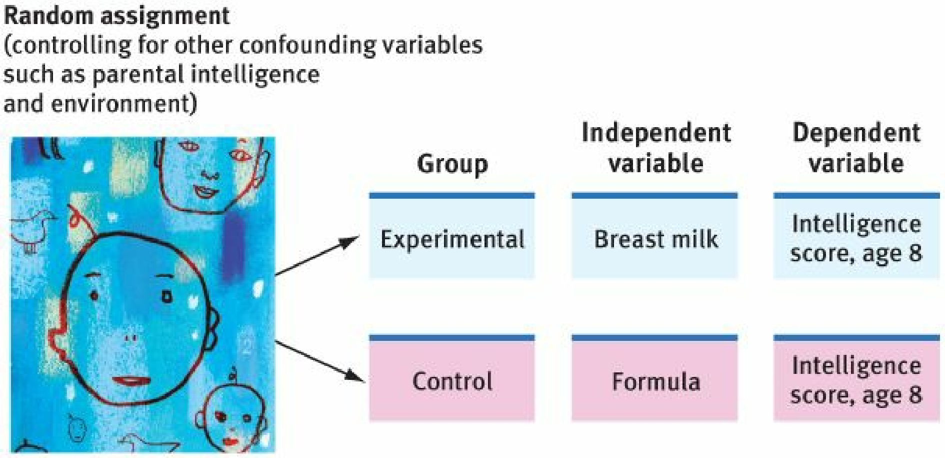
Random assignment
(controlling for other confounding variables
such as parental intelligence
and environment)
Group
Independent variable
Dependent variable
Experimental
Breast milk
Intelligence score, age 8
Control
Formula
Intelligence score, age 8

Figure 6.3

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R. Michael Wertz

Figure 6.3 Experimentation

To discern causation, psychologists control for confounding variables by randomly assigning some participants to an experimental group, others to a control group. Measuring the dependent variable (later intelligence test score) will determine the effect of the independent variable (type of milk).

Let’s pause to check your understanding using a simple psychology experiment: To test the effect of perceived ethnicity on the availability of rental housing, researchers sent identically worded e-mail inquiries to 1115 Los Angeles–area landlords (Carpusor & Loges, 2006). The researchers varied the ethnic connotation of the sender’s name and tracked the percentage of landlords’ positive replies (invitations to view the apartment in person). “Patrick McDougall,” “Said Al-Rahman,” and “Tyrell Jackson” received, respectively, 89 percent, 66 percent, and 56 percent invitations. (In this experiment, what was the independent variable? The dependent variable?)[6]

> “ *[We must guard] against not just racial slurs, but . . . against the subtle impulse to call Johnny back for a job interview, but not Jamal.* ”
>
> *U.S. President Barack Obama, Eulogy for Clementa Pinckney, June 26, 2015*

A key goal of experimental design is **validity**, which means the experiment will test what it is supposed to test. In the rental housing experiment, we might ask, “Did the e-mail inquiries test the effect of perceived ethnicity? Did the landlords’ response actually vary with the ethnicity of the name?”

validity
the extent to which a test or experiment measures or predicts what it is supposed to.

AP® EXAM TIP

The identification of independent and dependent variables is the single most likely concept to be tested on the AP® exam. Experiments are critical to psychology, and independent and dependent variables are critical to experiments.

Experiments can also help us evaluate social programs. Do early childhood education programs boost impoverished children’s chances for success? What are the effects of different antismoking campaigns? Do school sex-education programs reduce teen pregnancies? To answer such questions, we can experiment: If an intervention is welcomed but resources are scarce, we could use a lottery to randomly assign some people (or regions) to experience the new program and others to a control condition. If later the two groups differ, the intervention’s effect will be supported (Passell, 1993).

Let’s recap. A *variable* is anything that can vary (infant nutrition, intelligence, TV exposure—anything within the bounds of what is feasible and ethical to measure). Experiments aim to *manipulate* an *independent* variable, *measure* a *dependent* variable, and control *confounding* variables. An experiment has at least two different conditions: an *experimental condition* and a *comparison* or *control condition*. *Random assignment* works to minimize preexisting differences between the groups before any treatment effects occur. In this way, an experiment tests the effect of at least one independent variable (what we manipulate) on at least one dependent variable (the outcome we measure).

✓ Check Your Understanding

Ask Yourself

- If you were to become a research psychologist, what questions would you like to explore with experiments?

Test Yourself

- By using random assignment, researchers are able to control for ________________ ________________, which are other factors besides the independent variable(s) that may influence research results.

► Match the term on the left with the description on the right.

1. double-blind procedure	a. helps researchers generalize from a small set of survey responses to a larger population
2. random sampling	b. helps minimize preexisting differences between experimental and control groups
3. random assignment	c. controls for the placebo effect; neither researchers nor participants know who receives the real treatment

► Why, when testing a new drug to control blood pressure, would we learn more about its effectiveness from giving it to half of the participants in a group of 1000 than to all 1000 participants?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 6 REVIEW

6-1 What does it mean when we say two things are correlated, and what are positive and negative correlations?

- *Correlation* is the degree to which two variables are related, and how well one predicts the other.
- In a positive correlation, two factors increase or decrease together. In a negative correlation, one variable increases as the other decreases.
- A *correlation coefficient* describes the strength and direction of a relationship between two variables, from +1.00 (a perfect positive correlation) through zero (no correlation at all) to −1.00 (a perfect negative correlation).
- The relationship may be displayed in a *scatterplot*, in which each dot represents a value for the two variables.

6-2 Why do correlations enable prediction, but not cause-effect explanation?

- Correlations enable prediction because they show how two factors are related—either positively or negatively. A correlation can indicate the possibility of a cause-effect relationship, but it does not prove the direction of the influence, or whether an underlying third factor may explain the correlation.

6-3 What are illusory correlations, and what is regression toward the mean?

- *Illusory correlations* are random events that we notice and falsely assume are related.
- *Regression toward the mean* is the tendency for extreme or unusual scores to fall back toward their average.

6-4 What are the characteristics of experimentation that make it possible to isolate cause and effect?

- To discover cause-effect relationships, psychologists conduct *experiments,* manipulating one or more variables of interest and controlling other variables.
- Using *random assignment,* they can minimize *confounding variables,* such as preexisting differences between the *experimental group* (exposed to the treatment) and the *control group* (given a placebo or different version of the treatment).
- The *independent variable* is the factor the experimenter manipulates to study its effect; the *dependent variable* is the factor the experimenter measures to discover any changes occurring in response to the manipulation of the independent variable.
- Studies may use a *double-blind procedure* to avoid the *placebo effect* and researcher's bias.
- An experiment has *validity* if it tests what it is supposed to test.

Multiple-Choice Questions

1. Which of the following is an example of negative correlation?

a. People who spend more time exercising tend to weigh less.
b. Teenage females tend to have fewer speeding tickets than teenage males.
c. Students with lower IQ scores tend to have lower grades.
d. As hours studying for a test decrease, so do grades on that test.
e. Students' shoe sizes are not related to their grades.

2. In an experiment to test the effects of room temperature on test performance the independent variable is

a. the scores on the test before the experiment begins.
b. the scores on the test at the end of the experiment.
c. whether the teacher was male or female.

d. the temperature of the room.
e. the style of test (multiple choice versus essay).

3. Researchers have discovered that individuals with lower income levels report having fewer hours of total sleep. Therefore,

a. income and sleep levels are positively correlated.
b. income and sleep levels are negatively correlated.
c. income and sleep levels are inversely correlated.
d. income and sleep levels are not correlated.
e. lower income levels cause individuals to have fewer hours of sleep.

4. Which of the following correlation coefficients represents the strongest relationship between two variables?

a. +0.30
b. +0.75
c. +1.3
d. –0.85
e. –0.05

5. The purpose of random assignment is to

a. allow participants in both the experimental and control groups to be exposed to the independent variable.
b. ensure that every member of the population has an equal chance of being selected to participate in the research.
c. eliminate the placebo effect.
d. reduce potential confounding variables.
e. generate operational definitions for the independent and dependent variables.

6. In a drug study, neither the participants nor the person distributing the pills knows who is receiving the new drug and who is receiving the placebo. This type of research design is said to be a(n) _____ study.

a. correlational
b. confounding
c. double-blind

d. single-blind
e. illusory

Practice FRQs

1. Researchers surveyed 800 high school students enrolled in AP® Psychology to determine whether students with higher scores on anxiety scales had lower scores on standardized tests. Students with higher scores on anxiety scales were indeed found to have lower scores on standardized tests. Explain how each of the following terms or phrases applies to the situation described above:

- Random sampling
- Generalization
- Correlation does not mean causation

Answer

1 point: The researchers could use random sampling to choose the 800 students for their survey. The names could, for example, be chosen in such a way (say, every fiftieth name of those taking the course) to ensure that every test taker has the same chance of being selected. Page 47

1 point: If the random sample is used, it will be representative of the wider population from which it was drawn. Thus, the researchers will be able to generalize the results from their sample to the wider population of AP® Psychology students. The results of the survey would only apply to AP® Psychology students, not high school students in general. Pages 70–71

1 point: Even if anxiety and test scores correlate positively, the researchers would not be able to say that anxiety *caused* the lower standardized test scores. Page 53

2. Ms. Ledbetter wants to determine if the new review activity she developed will improve student performance on unit exams. She randomly separates 160 students into two groups. Group A reviews for the unit exam in the traditional manner they have always used. Group B participates in the new review activity. After reviewing, both groups are given the same unit exam and their scores are compared. Explain how the following terms relate to this study:

- Independent variable
- Dependent variable
- Control group

(3 points)

Module **7 Research Design and Ethics in Psychology**

LEARNING TARGETS

- 7-1 Explain the process of determining which research design to use.
- 7-2 Explain the value of simplified laboratory conditions in illuminating everyday life.
- 7-3 Explain why psychologists study animals, and describe the ethical guidelines that safeguard animal research subjects.
- 7-4 Describe the ethical guidelines that safeguard human research participants.
- 7-5 Describe how values affect psychological science.

Research Design

7-1 How would you know which research design to use?

Throughout this book, you will read about amazing psychological science discoveries. But how do we know fact from fiction? How do psychological scientists choose research methods and design their studies in ways that provide meaningful results? Understanding how research is done—how testable questions are developed and studied—is key to appreciating all of psychology. **Table 7.1** compares the features of psychology’s main research methods. In later modules, you will read about other research designs, including *twin studies* (Module 14) and *cross-sectional* and *longitudinal research* (Module 54).

TABLE 7.1 Comparing Research Methods

Research Method	Basic Purpose	How Conducted	What Is Manipulated	Weaknesses
Descriptive	To observe and record behavior	Do case studies, naturalistic observations, or surveys	Nothing	No control of variables; single cases may be misleading
Correlational	To detect naturally occurring relationships; to assess how well one variable predicts another	Collect data on two or more variables; no manipulation	Nothing	Cannot specify cause and effect
Experimental	To explore cause and effect	Manipulate one or more factors; use random	The independent variable(s)	Sometimes not feasible; results may not generalize

		assignment		to other contexts; not ethical to manipulate certain variables

In psychological research, no questions are off limits, except untestable (or unethical) ones: Does free will exist? Are people born evil? Is there an afterlife? Psychologists can’t test those questions. But they *can* test whether free will beliefs, aggressive personalities, and a belief in life after death influence how people think, feel, and act (Dechesne et al., 2003; Shariff et al., 2014; Webster et al., 2014).

Having chosen their question, psychologists then select the most appropriate research design—*experimental, correlational, case study, naturalistic observation, twin study, longitudinal,* or *cross-sectional*—and determine how to set it up most effectively. They consider how much money and time are available, ethical issues, and other limitations. For example, it wouldn’t be ethical for a researcher studying child development to use the experimental method and randomly assign children to loving versus punishing homes.

Next, psychological scientists decide on an operational definition—how to measure the behavior or mental process being studied. For example, researchers could measure aggressive behavior by measuring participants’ willingness to blast a stranger with supposed intense noise.

AP® EXAM TIP

Table 7.1 summarizes 13 pages of coverage. Spend some time with it, as it is information you will likely encounter on the AP® exam.

Researchers want to have confidence in their findings, so they carefully consider confounding variables—factors other than those being studied that may affect their interpretation of results.

Psychological research is a creative adventure. Researchers *design* each study, *measure* target behaviors, *interpret* results, and learn more about the fascinating world of behavior and mental processes along the way.

Understanding Everyday Behavior

7-2 How can simplified laboratory conditions illuminate everyday life?

When you see or hear about psychological research, do you ever wonder whether people's behavior in the lab will predict their behavior in everyday life? For example, does detecting the blink of a faint red light in a dark room say anything useful about flying a plane at night? Imagine that, after playing violent video games in the lab, teens become more willing to push buttons that they think electrically shock someone. Would this indicate that playing shooter games makes someone more likely to commit violence in everyday life?

Before you answer, consider: The experimenter *intends* the laboratory environment to be a simplified reality—one that simulates and controls important features of everyday life. Just as a wind tunnel lets airplane designers re-create airflow forces under controlled conditions, a laboratory experiment lets psychologists re-create psychological forces under controlled conditions.

An experiment's purpose is not to re-create the exact behaviors of everyday life but to test *theoretical principles* (Mook, 1983). In aggression studies, deciding whether to push a button that delivers a noise blast may not be the same as slapping someone in the face, but the principle is the same. *It is the resulting principles—not the specific findings—that illuminate everyday behaviors.*

When psychologists apply laboratory research on aggression to actual violence, they are applying theoretical principles of aggressive behavior, principles they have refined through many experiments. Similarly, it is the principles of the visual system, developed from experiments in artificial settings (such as looking at red lights in the dark), that researchers apply to more complex behaviors such as night flying. And many investigations show that principles derived in the laboratory do typically generalize to the everyday world (Anderson et al., 1999).

The point to remember: Psychological science focuses less on specific behaviors than on revealing general principles that help explain many behaviors. And remember: Although psychological principles may help predict behaviors for groups of people, they more faintly predict behavior for an individual in any given situation. Knowing students’ ages may clue us to their average vocabulary level, but individual students’ word power will vary.

Psychology’s Research Ethics

We have reflected on how a scientific approach can restrain biases. We have seen how case studies, naturalistic observations, and surveys help us describe behavior. We have also noted that correlational studies assess the association between two variables, showing how well one predicts another. We have examined the logic that underlies experiments, which use control conditions and random assignment of participants to isolate the effects of an independent variable on a dependent variable.

Yet, even knowing this much, you may still be approaching psychology with a mixture of curiosity and apprehension. So before we go any further, let’s entertain some common questions about psychology’s ethics and values.

Protecting Research Participants

Flip It Video: Ethics

Studying and Protecting Animals

7-3 Why do psychologists study animals, and what ethical guidelines safeguard animal research subjects?

Many psychologists study nonhuman animals because they find them fascinating. They want to understand how different species learn, think, and behave. Psychologists also study animals to learn about people. We humans are not *like* animals; we *are* animals, sharing a common biology. Animal experiments have therefore led to treatments for human diseases—insulin for diabetes, vaccines to prevent polio and rabies, transplants to replace defective organs.

Humans are complex. But some of the same processes by which we learn are present in rats, monkeys, and even sea slugs. The simplicity of the sea slug’s nervous system is precisely what makes it so revealing of the neural mechanisms of learning.

> “ *Rats are very similar to humans except that they are not stupid enough to*

purchase lottery tickets.”

Dave Barry, July 2, 2002

Sharing such similarities, should we not respect our animal relatives? The animal protection movement protests the use of animals in psychological, biological, and medical research. “We cannot defend our scientific work with animals on the basis of the similarities between them and ourselves and then defend it morally on the basis of differences,” noted Roger Ulrich (1991).

Out of this heated debate, two issues emerge. The basic one is whether it is right to place the well-being of humans above that of other animals. In experiments on stress and cancer, is it right that mice get tumors in the hope that people might not? Should some monkeys be exposed to an HIV-like virus in the search for an AIDS vaccine? Humans raise and slaughter 56 billion animals a year (Worldwatch Institute, 2013). Is our use and consumption of other animals as natural as the behavior of carnivorous hawks, cats, and whales?

“ *Please do not forget those of us who suffer from incurable diseases or disabilities who hope for a cure through research that requires the use of animals.*”

Psychologist Dennis Feeney (1987)

For those who give human life top priority, a second question emerges: What safeguards should protect the well-being of animals in research? One survey of animal researchers gave an answer. Some 98 percent supported government regulations protecting primates, dogs, and cats, and 74 percent also supported regulations providing for the humane care of rats and mice (Plous & Herzog, 2000). Many professional associations and funding agencies already have such guidelines. British Psychological Society (BPS) guidelines call for housing animals under reasonably natural living conditions, with companions for social animals (Lea, 2000). American Psychological Association (APA) guidelines state that researchers must provide “humane care and healthful conditions” and that testing should “minimize discomfort” (APA, 2012). The European Parliament also mandates standards for animal care and housing (Vogel, 2010). Most universities screen research proposals, often through an animal care ethics committee, and laboratories are regulated and inspected.

Animals have themselves benefited from animal research. One Ohio team of research psychologists measured stress hormone levels in samples of millions of dogs brought each year to animal shelters. They devised handling and stroking methods to reduce stress and ease the dogs’ transition to adoptive homes (Tuber et al., 1999). Other studies have helped improve care and management in animals’ natural habitats. By revealing our behavioral kinship with animals and the remarkable intelligence of chimpanzees, gorillas, and other animals, experiments have also led to increased empathy and protection for them. At its best, a psychology concerned for humans and sensitive to animals serves the welfare of both.

> “*The greatness of a nation can be judged by the way its animals are treated.*”
>
> *Mahatma Gandhi, 1869–1948*

MARY ALTAFFER/AP Images

Animal research benefiting animals Psychologists have helped zoos enrich animal environments, such as by reducing the “learned helplessness” of captivity by giving animals more choices (Kurtycz, 2015; Weir, 2013). Thanks partly to research on the benefits of novelty, control, and stimulation, these gorillas are enjoying an improved quality of life in New York’s Bronx Zoo.

Studying and Protecting Humans

7-4 What ethical guidelines safeguard human research participants?

What about human participants? Does the image of white-coated scientists seeming to deliver electric shocks trouble you? Actually, most psychological studies are free of such stress. Blinking lights, flashing words, and pleasant social interactions are more common. Moreover, psychology's experiments are mild compared with the stress and humiliation often inflicted in reality TV shows. In one episode of *The Bachelor*, a man dumped his new fiancée on camera, at the producers' request, for the woman who earlier had finished second (Collins, 2009).

Occasionally, though, researchers do temporarily stress or deceive people, but only when they believe it is essential to a justifiable end, such as understanding and controlling violent behavior or studying mood swings. Some experiments won't work if participants know everything beforehand. (Wanting to be helpful, the participants might try to confirm the researcher's predictions.)

The ethics codes of the APA and Britain's BPS urge researchers to (1) obtain potential participants' **informed consent** to take part, (2) protect participants from greater-than-usual harm and discomfort, (3) keep information about individual participants confidential, and (4) fully **debrief** people (explain the research afterward, including any temporary deception). As with nonhuman animals, most university ethics committees (sometimes called *institutional review boards*) also have guidelines that screen research proposals and safeguard human participants' well-being.

informed consent

giving potential participants enough information about a study to enable them to choose whether they wish to participate.

debriefing

the postexperimental explanation of a study, including its purpose and any deceptions, to its participants.

Values in Psychology

7-5 How do values affect psychological science?

Values affect what we study, how we study it, and how we interpret results. Researchers’ values influence their choice of research topics. Should we study worker productivity or worker morale? Sex discrimination or gender differences? Conformity or independence? Values can also color our observations and interpretations; sometimes we see what we want or expect to see (**Figure 7.1**).

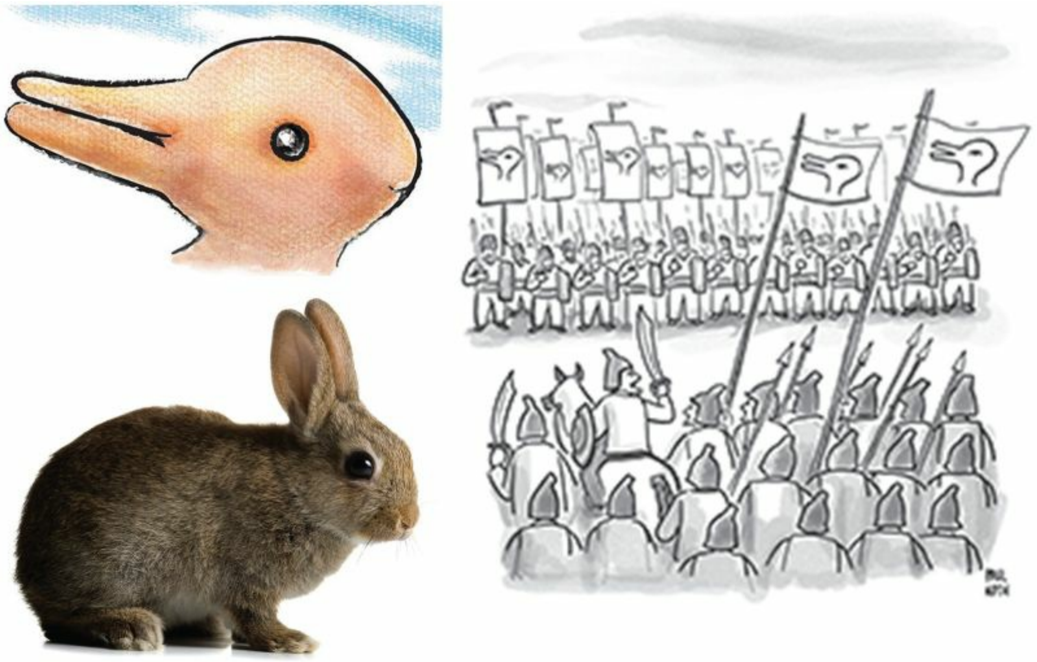

Figure 7.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Left: Rubberball/Mike Kemp/Getty Images, Right: The New Yorker Collection, Paul Noth, from cartoonbank.com. All Rights Reserved.

“There can be no peace until they renounce their Rabbit God and accept our Duck God.”

Figure 7.1 What do you see?

Our expectations influence what we perceive. Did you see a duck or a rabbit? Show some friends this image with the rabbit photo covered up and see if they are more likely to perceive a duck instead. (Inspired by Shepard, 1990.)

Even the words we use to describe traits and tendencies can reflect our values. In psychology and in everyday speech, labels describe and labels evaluate: One person's *rigidity* is another's *consistency.* One person's *undocumented worker* is another's *illegal alien.* One person's *faith* is another's *fanaticism.* One country's *enhanced interrogation techniques* become *torture* when practiced by an enemy. Our labeling someone as *firm* or *stubborn, careful* or *picky, discreet* or *secretive* reveals our own attitudes.

Popular applications of psychology also contain hidden values. If you defer to "professional" guidance about how to live—how to get along with parents, how to achieve self-fulfillment, how to respond to sexual feelings, how to succeed in school—you are accepting value-laden advice. A science of behavior and mental processes can help us reach our goals. But it cannot decide what those goals should be.

If some people see psychology as merely common sense, others have a different concern—that it is becoming dangerously powerful. Might psychology be used to manipulate people?

Knowledge, like all power, can be used for good or evil. Nuclear power has been used to light up cities—and to demolish them. Persuasive power has been used to educate people—and to deceive them. Although psychology does have the power to deceive, its purpose is to enlighten. Every day, psychologists explore ways to enhance learning, creativity, and compassion. Psychology speaks to many of our world's great problems—war, overpopulation, prejudice, family crises, crime—all of which involve attitudes and behaviors. Psychology also speaks to our deepest longings—for nourishment, for love, for happiness. Psychology cannot address all of life's great questions, but it speaks to some mighty important ones.

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Psychology speaks In making its historic 1954 school desegregation decision, the U.S. Supreme Court cited the expert testimony and research of psychologists Kenneth Clark and Mamie Phipps Clark (1947). The Clarks reported that, when given a choice between Black and White dolls, most African-American children chose the White doll, which seemingly indicated internalized anti-Black prejudice.

✓ Check Your Understanding

Ask Yourself

- Were any of this module’s questions your questions? Do you have other questions or concerns about psychology?

Test Yourself

- How are animal subjects and human research participants protected?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 7 REVIEW

7-1 How would you know which research design to use?

- Psychological scientists design studies and choose research methods that will best provide meaningful results.
- Researchers generate *testable questions*, and then carefully consider the best *design* to use in studying those questions (experimental, correlational, case study, naturalistic observation, twin study, longitudinal, or cross-sectional).
- Next, psychologists *measure* the variables they are studying, and finally they *interpret* their results, keeping possible confounding variables in mind.

7-2 How can simplified laboratory conditions illuminate everyday life?

- Researchers intentionally create a controlled, artificial environment in the laboratory in order to test general theoretical principles. These general principles help explain everyday behaviors.

7-3 Why do psychologists study animals, and what ethical guidelines safeguard animal research subjects?

- Some psychologists are primarily interested in animal behavior; others want to better understand the physiological and psychological processes shared by humans and other species.
- Government agencies have established standards for animal care and housing. Professional associations and funding agencies also have guidelines for protecting animals’ well-being.

7-4 What ethical guidelines safeguard human research participants?

- The APA ethics code outlines standards for safeguarding human participants’ well-being, including obtaining their *informed consent* and *debriefing* them later.

7-5 How do values affect psychological science?

- Psychologists’ values influence their choice of research topics, their theories and observations, their labels for behavior, and their professional advice.
- Applications of psychology’s principles have been used mainly in the service of humanity.

Multiple-Choice Questions

1. What must a researcher do to fulfill the ethical principle of informed consent?

a. Keep information about participants confidential.
b. Provide financial compensation to the participants.
c. Protect participants from potential harm.
d. Provide participants with enough information about a study to enable a rational decision about whether to participate.
e. Provide participants with a postexperimental explanation of the study.

2. Which ethical principle requires that at the end of the study participants be told about the true purpose of the research?

a. Institutional review board approval
b. Informed consent
c. Confidentiality
d. Debriefing
e. Protection from physical harm

3. The laboratory environment is designed to

a. exactly re-create the events of everyday life.

b. re-create psychological forces under *controlled* conditions.
c. re-create psychological forces under *random* conditions.
d. minimize the use of animals and humans in psychological research.
e. provide the opportunity to do case study research.

4. Which of the following animal studies is most likely to receive approval?

a. Do monkeys who smoke get cancer?
b. Are dogs who are abused violent?
c. Will rats deprived of food for 1 week survive?
d. What are the effects of raising kittens in isolation?
e. Can dolphins learn simple language?

Practice FRQs

1. Nonhuman animals are often subjects in psychological experiments. Provide three reasons why a psychologist might use animals instead of humans in a study.

Answer

1 point: Some researchers use nonhuman animals because they are interested in understanding the animals themselves, including their thinking and behaviors. Page 61

1 point: Others use nonhuman animals to reduce the complexity that is part of human research. They hope to understand principles that may be similar to those that govern human psychological phenomena. Page 61

1 point: Researchers also study nonhuman animals in order to apply the findings in ways that will help both humans and the other animals. Page 61

2. Researchers interested in studying stress gave 150 high school seniors a very difficult math exam. After the test, the researchers measured stress by examining physiological changes with extensive medical testing that included drawing blood samples. When the test was over, they shared the results with the students but did not publish individual data. Explain whether or not this study conforms to each of the ethical standards:

- Informed consent
- Debriefing
- Confidentiality
- Protection from harm

(4 points)

Module **8 Statistical Reasoning in Everyday Life**

LEARNING TARGETS

- 8-1 Explain why we need statistics in psychology and in everyday life.
- 8-2 Describe descriptive statistics.
- 8-3 Explain how we describe data using the three measures of central tendency.
- 8-4 Discuss the relative usefulness of the two measures of variation.
- 8-5 Describe inferential statistics.
- 8-6 Explain how we determine whether an observed difference can be generalized to other populations.

The Need for Statistics

8-1 Why do we need statistics in psychology and in everyday life?

For psychologists using descriptive, correlational, experimental, and other research designs, statistics are the tools that allow them to measure variables and then interpret results. Yet, accurate statistical understanding benefits everyone. To be an educated person today is to be able to apply simple statistical principles to everyday reasoning. We don't need to memorize complicated formulas to think more clearly and critically about data.

Off-the-top-of-the-head estimates often misread reality and mislead the public. Someone throws out a big, round number. Others echo it, and before long the big, round number becomes public misinformation. Two examples:

- *Ten percent of people are gay or lesbian.* Or is it 3 to 4 percent, as suggested by various national surveys (Module 53)?
- *We ordinarily use only 10 percent of our brain.* Or is it closer to 100 percent (Module 12)?

The point to remember: Doubt big, round, undocumented numbers. If you read that there are one million missing children, two million homeless, or three million spouse abusers, you can be pretty sure that someone is guessing. If they want to emphasize the problem, they will be motivated to guess big. If they want to minimize the problem, they will guess small.

FYI

When setting goals, we love big, round numbers. We're far more likely to want to lose 20 pounds than 19 or 21 pounds. And by modifying their behavior, batters are nearly four times more likely to finish the season with a .300 average than with a .299 average (Pope & Simonsohn, 2011).

Statistical illiteracy also feeds needless health scares (Gigerenzer, 2010). In the 1990s, the British press reported a study showing that women taking a particular contraceptive pill had a 100 percent increased risk of blood clots that could produce strokes. This caused thousands of women to stop taking the pill, leading to a wave of unwanted pregnancies and an estimated 13,000 additional abortions (which also are associated with increased blood-clot risk). And what did the study actually find? A 100 percent increased risk, indeed—but only from 1 in 7000 to 2 in 7000. Such false alarms underscore the need to teach statistical reasoning and to present statistical information more transparently.

Descriptive Statistics

8-2 What are descriptive statistics?

Once researchers have gathered their data, they may use **descriptive statistics** to measure and describe characteristics of the group under study—similar to the way teachers use descriptive statistics to assess how their students have performed. One way to do this is to convert the data into a simple *bar graph*, called a **histogram,** as in **Figure 8.1**, which displays a distribution of different brands of trucks still on the road after a decade. When reading statistical graphs such as this one, take care. It's easy to design a graph to make a difference look big (Figure 8.1a) or small (Figure 8.1b). The secret lies in how you label the vertical scale (the *y*-axis).

descriptive statistics

numerical data used to measure and describe characteristics of groups. Includes measures of central tendency and measures of variation.

histogram

a bar graph depicting a frequency distribution.

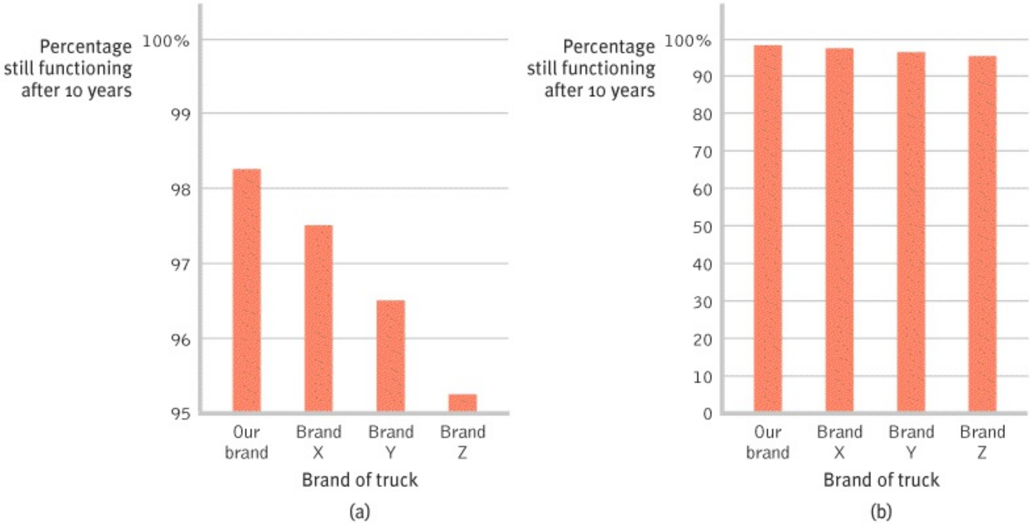

Figure 8.1

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Figure 8.1 Read the scale labels

An American truck manufacturer offered graph (a)—with actual brand names included—to suggest the much greater durability of its trucks. Note, however, how the y-axis of each graph is labeled. The range for the y-axis label in graph (a) is only from 95 to 100. The range for graph (b) is from 0 to 100. All the trucks rank as 95 percent and up, so almost all are still functioning after 10 years, which graph (b) makes clear.

The point to remember: Think smart. When viewing graphs, read the scale labels and note their range.

Measures of Central Tendency

8-3 How do we describe data using the three measures of central tendency?

The next step is to summarize the data using some *measure of central tendency*, a single score that represents a whole set of scores. The simplest measure is the **mode**, the most frequently occurring score or scores. The most familiar is the **mean**, or arithmetic average—the total sum of all the scores divided by the number of scores. The midpoint—the 50th percentile—is the **median**. On a divided highway, the median is the middle. So, too, with data: If you arrange all the scores in order from the highest to the lowest, half will be above the median and half will be below it. In a symmetrical, bell-shaped distribution of scores, the mode, mean, and median scores may be similar.

mode

the most frequently occurring score(s) in a distribution.

mean

the arithmetic average of a distribution, obtained by adding the scores and then dividing by the number of scores.

median

the middle score in a distribution; half the scores are above it and half are below it.

Patrick Hardin/Cartoonstock.com

“Figures can be misleading. So I’ve written a song which I think expresses the real story of the firm’s performance this quarter.”

Measures of central tendency neatly summarize data. But consider what happens to the mean when a distribution is lopsided, when it’s **skewed** by a few way-out scores. With income data, for example, the mode, median, and mean often tell very different stories (**Figure 8.2**). This happens because the mean is biased by a few extreme incomes. When Microsoft co-founder Bill Gates sits down in an intimate café, its average (mean) customer instantly becomes a billionaire. But the median customer’s wealth remains unchanged. Understanding this, you can see why, according to the 2010 U.S. Census, nearly 65 percent of U.S. households have “below average” income. The bottom half of earners receive much less than half the national income cake. So, most Americans make less than average (the mean). Mean and median tell different true stories.

skewed distribution

a representation of scores that lack symmetry around their average value.

FYI

The average person has one ovary and one testicle.

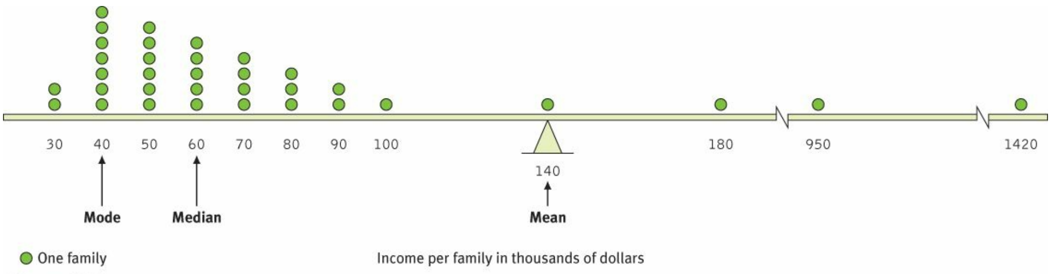

Figure 8.2

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Figure 8.2 A skewed distribution

This graphic representation of the distribution of a village's incomes illustrates the three measures of central tendency—mode, median, and mean. Note how just a few high incomes make the mean—the fulcrum point that balances the incomes above and below—deceptively high.

The point to remember: Always note which measure of central tendency is reported. If it is a mean, consider whether a few atypical scores could be distorting it.

Measures of Variation

8-4 What is the relative usefulness of the two measures of variation?

Knowing the value of an appropriate measure of central tendency can tell us a great deal. But the single number omits other information. It helps to know something about the amount of *variation* in the data—how similar or diverse the scores are. Averages derived from scores with low variability are more reliable than averages based on scores with high variability. Consider a basketball player who scored between 13 and 17 points in each of the season's first 10 games. Knowing this, we would be more confident that she would score near 15 points in her next game than if her scores had varied from 5 to 25 points.

The **range** of scores—the gap between the lowest and highest—provides only a crude estimate of variation. A couple of extreme scores in an otherwise similar group, such as the $950,000 and $1,420,000 incomes in Figure 8.2, will create a deceptively large range.

range

the difference between the highest and lowest scores in a distribution.

The more useful standard for measuring how much scores deviate from one another is the **standard deviation.** It better gauges whether scores are packed together or dispersed, because it uses information from each score (**Table 8.1**). The computation assembles information about how much individual scores differ from the mean, which can be very telling. Another example: If your high school serves a community where most families have similar incomes, family income data will have a relatively small standard deviation compared with a community with more diverse incomes.

standard deviation

a computed measure of how much scores vary around the mean score.

TABLE 8.1 Standard Deviation Is Much More Informative Than Mean Alone

Note that the test scores in Class A and Class B have the same mean (80) but very different standard deviations, which tell us more about how the students in each class are really faring.

Test Scores in Class A

Score	Deviation from the Mean	Squared Deviation
72	−8	64
74	−6	36
77	−3	9
79	−1	1
82	+2	4
84	+4	16
85	+5	25
87	+7	49
Total = 640	Sum of (deviations)^2 = 204	
Mean = 640 ÷ 8 = 80		
Standard deviation=Sum of (deviations)2Number of scores=2048=5.0		

Test Scores in Class B

Score	Deviation from the Mean	Squared Deviation
60	−20	400
60	−20	400
70	−10	100
70	−10	100
90	+10	100
90	+10	100
100	+20	400
100	+20	400

Total = 640	Sum of (deviations)^2 = 2000
Mean = 640 ÷ 8 = 80	
Standard deviation=Sum of (deviations)2Number of scores=20008=15.8	

You can grasp the meaning of the standard deviation if you consider how scores naturally tend to be distributed in nature. Large numbers of data—heights, weights, intelligence scores, grades (though not incomes)—often form a symmetrical, *bell-shaped* distribution. Most cases fall near the mean, and fewer cases fall near either extreme. This bell-shaped distribution is so typical that we call the curve it forms the **normal curve.**

normal curve

(normal distribution) a symmetrical, bell-shaped curve that describes the distribution of many types of data; most scores fall near the mean (about 68 percent fall within one standard deviation of it) and fewer and fewer near the extremes.

As **Figure 8.3** shows, a useful property of the normal curve is that roughly 68 percent of the cases fall within one standard deviation on either side of the mean. About 95 percent of cases fall within two standard deviations. Thus, as Module 61 notes, about 68 percent of any group of people taking an intelligence test will score within ±15 points of 100. About 95 percent will score within ±30 points.

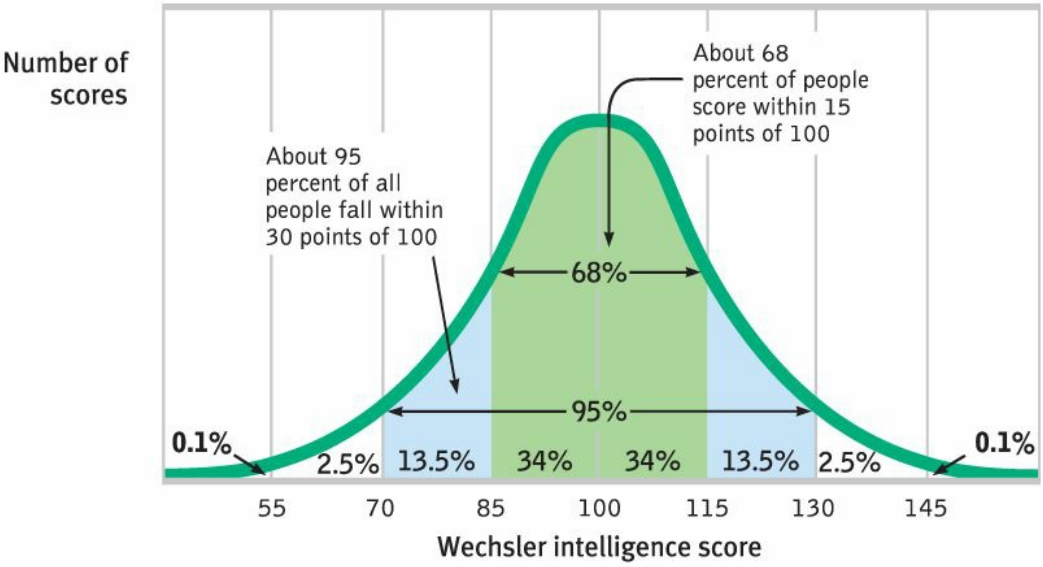

Figure 8.3
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Figure 8.3 The normal curve

Scores on aptitude tests tend to form a normal, or bell-shaped, curve. For example, the most commonly used intelligence test, the Wechsler Adult Intelligence Scale, calls the average score 100.

Flip It Video: The Normal Curve

Inferential Statistics

8-5 What are inferential statistics?

Data are “noisy.” The average score in one group (children who were breast-fed as babies) could conceivably differ from the average score in another group (children who were bottle-fed) not because of any real difference but merely because of chance fluctuations in the people sampled. How confidently, then, can we infer that an observed difference is not just a fluke—a chance result from the research sample? For guidance, we can use **inferential statistics** to determine how reliable and statistically significant the differences are. This way we will know if results can be generalized to a larger population.

inferential statistics

numerical data that allow one to generalize—to infer from sample data the probability of something being true of a population.

When Is an Observed Difference Reliable?

8-6 How do we know whether an observed difference can be generalized to other populations?

In deciding when it is safe to generalize from a sample, we should keep three principles in mind:

1. ***Representative samples are better than biased samples.*** As noted in Module 5, the best basis for generalizing is not from the exceptional and memorable cases one finds at the extremes but from a representative sample of cases. Research never randomly samples the whole human population. Thus, it pays to keep in mind what population a study has sampled.

2. ***Less-variable observations are more reliable than those that are more variable.*** As we noted earlier in the example of the basketball player whose game-to-game points were consistent, an average is more reliable when it comes from scores with low variability.
3. ***More cases are better than fewer.*** An eager high school senior visits two university campuses, each for a day. At the first, the student randomly attends two classes and discovers both instructors to be witty and engaging. At the next campus, the two sampled instructors seem dull and uninspiring. Returning home, the student (discounting the small sample size of only two teachers at each institution) tells friends about the “great teachers” at the first school and the “bores” at the second. Again, we know it but we ignore it: *Averages based on many cases are more reliable* (less variable) than averages based on only a few cases. After noticing that small schools were overrepresented among the most successful schools, several foundations invested in splitting larger schools into smaller ones—without realizing that small schools were also overrepresented among the *least* successful, because schools with fewer students have more variable outcomes (Kahneman, 2011). Again, more cases make for a more reliable average.

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> *“The poor are getting poorer, but with the rich getting richer it all averages out in the long run.”*

The point to remember: Smart thinkers are not overly impressed by a few anecdotes. Generalizations based on a few unrepresentative cases are unreliable.

When Is an Observed Difference Significant?

Let’s say you compared men’s and women’s scores on a laboratory test of aggression and found a gender difference. But individuals differ. How likely is it that the difference you observed was just a fluke? Statistical testing can estimate the probability of the result occurring by chance.

AP® EXAM TIP

Sometimes a phrase that is frequently used in the media has a more specific meaning when used in psychology. That’s the case with the phrase “statistically significant.” Make sure you know the precise meaning of this. It has been on the AP® exam in the past.

Here is the underlying logic: When averages from two samples are each reliable measures of their respective populations (as when each is based on many observations that have small variability), then their *difference* is probably reliable as well. (Example: The less the variability in women’s and in men’s aggression scores, the more confidence we would have that any observed gender difference is reliable.) And when the difference between the sample averages is *large,* we have even more confidence that the difference between them reflects a real difference in their populations.

In short, when sample averages are reliable, and when the difference between them is relatively large, we say the difference has **statistical significance.** This means that the observed difference is probably not due to chance variation between the samples.

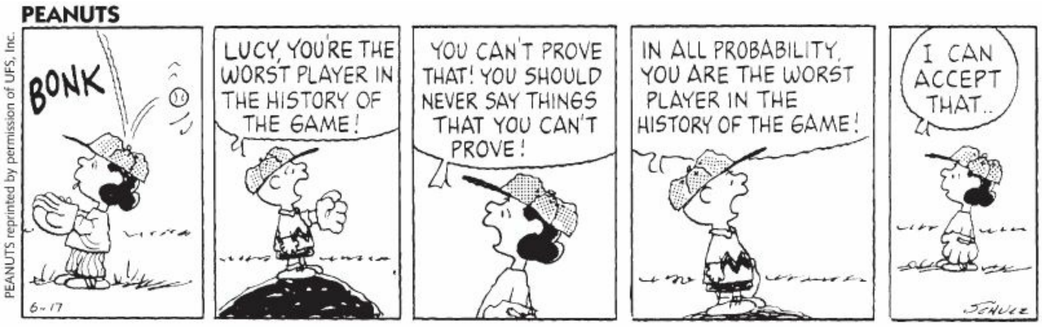
statistical significance

a statistical statement of how likely it is that an obtained result occurred by chance.

In judging statistical significance, psychologists are conservative. They are like juries who must presume innocence until guilt is proven. For most psychologists, proof beyond a reasonable doubt means not making much of a finding unless the odds of its occurring by chance, if no real effect exists, are less than 5 percent.

When reading about research, you should remember that, given large enough or homogeneous enough samples, a difference between them may be “statistically significant” yet have little *practical* significance. In one study of nearly 700,000 Facebook users, researchers exposed people to status updates with more or with less positive words. Given the supersized sample’s “statistical power,” the tweaking produced a “statistically significant” but trivial effect. For example, those who received fewer posts with positive words responded with 0.1 percent fewer positive words themselves—a “statistically significant” effect, though one too tiny to be meaningful in the real world (Morin, 2014). Comparisons of intelligence test scores among hundreds of thousands of first-born and later-born individuals indicate a highly significant tendency for first-born individuals to have higher average scores than their later-born siblings (Rohrer et al., 2015; Zajonc & Markus, 1975). But because the scores differ only slightly, this “significant” difference has little practical importance.

The point to remember: Statistical significance indicates the *likelihood* that a result could have happened by chance. But this does not say anything about the *importance* of the result.


PEANUTS
PEANUTS reprinted by permission of UFS, Inc.
BONK
6-17
LUCY, YOU'RE THE WORST PLAYER IN THE HISTORY OF THE GAME!
YOU CAN'T PROVE THAT! YOU SHOULD NEVER SAY THINGS THAT YOU CAN'T PROVE!
IN ALL PROBABILITY, YOU ARE THE WORST PLAYER IN THE HISTORY OF THE GAME!
I CAN ACCEPT THAT..
SCHULZ

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Check Your Understanding

Ask Yourself

- Find a graph in a popular magazine ad. How does the advertiser use (or abuse) statistics to make a point?

Test Yourself

- The arithmetic average of a distribution of scores is the _______________. The score that shows up most often is the _______________. The score right in the middle of a distribution (half the scores above it; half below) is the _______________. We determine how much scores vary around the average in a way that includes information about the _______________ of scores (difference between highest and lowest) by using the _______________ _______________ formula.
- Can you solve this puzzle?

  The registrar's office at the University of Michigan has found that usually about 100 students in Arts and Sciences have perfect grades at the end of their first term at the university. However, only about 10 to 15 students graduate with perfect grades. What do you think is the most likely explanation for the fact that there are more perfect grades after one term than at graduation (Jepson et al., 1983)?

- _______________ statistics summarize data, while _______________ statistics determine if data can be generalized to other populations.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 8 REVIEW

8-1 Why do we need statistics in psychology and in everyday life?

- Psychological researchers use statistics to measure variables and interpret results.
- All of us benefit from a basic understanding of statistics, which helps us think smarter about medical advice and news reports of all kinds.

8-2 What are descriptive statistics?

- Researchers use *descriptive statistics* to measure and describe characteristics of groups under study, often using a *histogram* to display data.
- Descriptive statistics include measures of central tendency and measures of variation.

8-3 How do we describe data using the three measures of central tendency?

- A measure of central tendency is a single score that represents a whole set of scores. Three such measures are the *mode* (the most frequently occurring score), the *mean* (the arithmetic average), and the *median* (the middle score in a group of data).

8-4 What is the relative usefulness of the two measures of variation?

- Measures of variation tell us how diverse data are. Two measures of variation are the *range* (which describes the gap between the highest and lowest scores) and the *standard deviation* (which states how much scores vary around the mean, or average, score).
- The range offers only a crude measure of how much the data vary; the

standard deviation is far better at giving researchers a clear understanding of variation.

- Scores often form a *normal* (or bell-shaped) *curve*.

8-5 What are inferential statistics?

- Researchers use *inferential statistics* to determine the probability of their findings being also true of the larger population.
- Inferential statistics include ways of determining the reliability and significance of an observed difference between the results for different groups.

8-6 How do we know whether an observed difference can be generalized to other populations?

- To feel confident about generalizing an observed difference to other populations, we would need to know that the difference was reliable and also significant.
- Reliable differences are based on samples that:
  - are representative of the larger population being studied,
  - demonstrate low variability, on average; and
  - consist of many cases.
- We can say that an observed difference has *statistical significance* if the sample averages are reliable and when the difference between them is large.

Multiple-Choice Questions

1. What is the range of the following: 12, 25, 33, 40, 80?

a. 68
b. 98
c. 33
d. 38

e. 190

2. Which measure of central tendency is most influenced by outliers (data that is extremely different from other data in the set)?

a. Mean
b. Median
c. Mode
d. Standard deviation
e. Histogram

3. A researcher calculates statistical significance for her study and finds a 5 percent chance that results are due to chance. Which of the following is an accurate interpretation of this finding?

a. This is highly statistically significance.
b. This is the minimum result typically considered statistically significant.
c. This is not statistically significant.
d. There is no way to determine statistical significance without replication of the study.
e. Chance or coincidence is unrelated to statistical significance.

4. Descriptive statistics ___________, while inferential statistics _______________.

a. indicate the significance of the data; summarize the data
b. describe data from experiments; describe data from surveys and case studies
c. are measures of central tendency; are measures of variance
d. determine if data can be generalized to other populations; summarize data
e. summarize data; assess if data can be generalized

5. In a normal distribution, what percentage of the scores in the distribution falls within one standard deviation on either side of the mean?

a. 34 percent

b. 40 percent
c. 50 percent
d. 68 percent
e. 95 percent

Practice FRQs

1. A researcher is conducting a study and wants to ensure that the sample chosen to participate will yield good results.

- Why is it better to have a large sample of data instead of a small sample?
- What happens to reliability as sample size increases?

Answer

1 point: A larger sample will be less variable (for example, a large sample from a population with 40 percent women and 60 percent men will be more likely to be close to that demographic breakdown than a smaller sample). Page 70

1 point: As the sample size increases, the results are more likely to be reliable (represent the opinions) of the population as a whole. Page 70

2. The following data set includes information from survey research in a psychology course regarding how many hours each student in the class spent preparing for the exam.

Student	Number of hours reported studying
1	***2***
2	***3***
3	***6***
4	***8***
5	***9***
6	***9***
7	***21***

Examine the data and respond to the following:

- Identify the following from the data:
    - Range
    - Mode
    - Median
- Explain why the teacher may wish to calculate the standard deviation for this set of data.

(4 points)

UNIT II REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

hindsight bias, p. 38
theory, p. 42
hypothesis, p. 42
operational definition, p. 42
replication, p. 43
case study, p. 44
naturalistic observation, p. 45
survey, p. 47
sampling bias, p. 47
population, p. 47
random sample, p. 47
correlation, p. 51
correlation coefficient, p. 51
variable, p. 51
scatterplot, p. 51
illusory correlation, p. 53
regression toward the mean, p. 53
experiment, p. 54
experimental group, p. 54
control group, p. 54
random assignment, p. 54
double-blind procedure, p. 55
placebo [pluh-SEE-bo] effect, p. 55
independent variable, p. 55
confounding variable, p. 56
dependent variable, p. 56

validity, p. 56

informed consent, p. 62

debriefing, p. 62

descriptive statistics, p. 66

histogram, p. 66

mode, p. 67

mean, p. 67

median, p. 67

skewed distribution, p. 67

range, p. 68

standard deviation, p. 68

normal curve, p. 68

inferential statistics, p. 70

statistical significance, p. 71

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. A student is interested in knowing how widely the academic aptitude of college-bound students varies at her school. Which of the following statistical methods should she use to determine how much students' SAT scores vary from the school's average SAT score?

a. Correlation coefficient
b. Mean
c. Median
d. Standard deviation
e. Range

2. Which method should a psychology researcher use if she is interested in testing whether a specific reward in a classroom situation causes students to behave better?

a. Case study

b. Experiment
c. Survey
d. Naturalistic observation
e. Correlation

3. In a perfectly normal distribution of scores, which of the following statements is true?

a. The mean, median, and mode are all the same number.
b. The mode is equal to the standard deviation.
c. The scores are positively correlated.
d. The mean minus the mode equals the median.
e. There is a positive skew to the distribution of data.

4. Which of the following describes the placebo effect?

a. Students in art class are not told that their work will be evaluated for a scholarship.
b. Participants in an experiment do not know if they are in the experimental or control group.
c. Participants in a drug study are given an inert pill instead of the drug and behave as though they were given the drug.
d. Only females are chosen for a study, even though the population included males.
e. Experimenters manipulate one variable in a study, but not any others.

5. Which of the following represents naturalistic observation?

a. Researchers go to the mall and distribute surveys about the stores in the mall.
b. Researchers bring participants into a laboratory to see how they respond to a puzzle with no solution.
c. A principal looks at the relationship between the number of student absences and their grades.
d. Researchers observe students’ seating patterns in the cafeteria.
e. Two grandparents sit in the front row to watch their grandson’s first

piano recital.

6. “Monday morning quarterbacks” rarely act surprised about the outcome of weekend football games. This tendency to believe they knew how the game would turn out is best explained by which psychological principle?

a. Overconfidence
b. Hindsight bias
c. Common sense
d. Illusory correlation
e. Random sampling

7. Researchers studying gender have found that

a. there are more similarities than differences between the genders.
b. there are no significant cognitive differences between the genders.
c. there are no significant emotional differences between the genders.
d. research tools are not capable of determining if there are or are not true differences between the genders.
e. differences between the genders are becoming more pronounced over time.

8. A journalism student is writing an article about her school’s new cell-phone policy, and she’d like to interview a random sample of students. Which of the following is the best example of a random sample?

a. The writer arrives at school early and interviews the first five students who come through the main entrance.
b. The writer pulls the names of five students from a hat that contains all students’ names. She interviews the five selected students.
c. The writer asks her teacher if she can distribute a brief survey to the students in her AP® Psychology class.
d. The writer passes out brief surveys to 50 students in the hall and uses the 18 surveys returned to her as the basis of her article.
e. The writer asks the principal for the names of 10 students who have had their cell phones confiscated for a day for violating the policy.

She interviews these 10 students.

9. Which of the following is a positive correlation?

a. As study time increases, students achieve lower grades.
b. As levels of self-esteem decline, levels of depression increase.
c. People who exercise regularly are more likely to be overweight.
d. Gas mileage decreases as vehicle weight increases.
e. Repeatedly shooting free throws in basketball is associated with a smaller percentage of missed free throws.

0. Why is random assignment of participants to groups an important aspect of a properly designed experiment?

a. If the participants are randomly assigned, the researcher can assume that the people in each group are similar.
b. By randomly assigning participants, the researcher knows that whatever is learned from the experiment will also be true for the population from which the participants were selected.
c. Random assignment keeps expectations from influencing the results of the experiment.
d. If participants are not randomly assigned, it is impossible to replicate the experiment.
e. Statistical analysis cannot be performed on an experiment if random assignment is not used.

1. Which of the following demonstrates the need for psychological science?

a. Psychology’s methods are unlike those of any other science.
b. Psychological experiments are less valuable without psychological science.
c. Our commonsense thinking about human thoughts and behaviors is not always accurate.
d. Commonsense thinking does not provide correct answers unless it is applied through the scientific method.
e. Psychological science research is superior to that of other sciences

such as biology and physics.

2. Which of the following is a potential problem with case studies?

a. They provide too much detail, and the researcher is likely to lose track of the most important facts.
b. They are generally too expensive to be feasible.
c. The information learned may not apply to the wider population.
d. They are technically difficult and most researchers don’t have the skills to do them properly.
e. The dependent variable is difficult to operationally define in a case study.

3. Which of the following is *not* an ethical principle regarding experimental research on humans?

a. Researchers must protect participants from needless harm and discomfort.
b. Participants must take part in the study on a voluntary basis.
c. Personal information about individual participants must be kept confidential.
d. Research studies must be fully explained to participants when the study is completed.
e. Participants should always be informed of the hypothesis of the study before they agree to participate.

4. There is a negative correlation between TV watching and grades. What can we conclude from this research finding?

a. We can conclude that this is an illusory correlation.
b. We can conclude that TV watching leads to lower grades.
c. We can conclude that TV watching leads to higher grades.
d. We can conclude that the grades students get impact their TV watching habits.
e. We can conclude that a student who watches a lot of TV is likely to have lower grades.

5. Which of the following groups of scores would have the smallest standard deviation?

a. 20, 40, 60, 80, 100
b. 5, 15, 25, 35, 45
c. 2, 4, 6, 8, 10
d. 100, 200, 300, 400, 500
e. 15, 30, 45, 60, 75

Use this scenario to answer questions 16–20:

Researchers wanted to find out if eating cookies would increase a person’s ability to remember the names of U.S. presidents. Thirty males and 30 females were used in the experiment. A third of these people (Group A) were given cookies while studying the names. Another third (Group B) were given nothing while studying the names. The final third (Group C) were given mint-flavored candy while studying the names. After gathering all their results, the researchers found that Group A did substantially better than Group B, but about the same as Group C.

6. The dependent variable in this study is

a. the mint candy.
b. the test scores.
c. the cookies.
d. eating any food.
e. the list of presidents.

7. The independent variable in this study is

a. the mint candy.
b. the test scores.
c. the cookies.
d. the food treatment.
e. the list of presidents.

8. Which of the following are the experimental group(s) of this study?

a. Group A
b. Group B

c. Group C
d. Groups A & C
e. Groups B & C

9. Which of the following is/are the control group(s) of this study?

a. Group A
b. Group B
c. Group C
d. Groups A & B
e. Groups B & C

0. Which of the following is the best conclusion for this study?

a. Eating cookies will always improve memory recall.
b. Eating cookies tends to improve memory recall.
c. Eating cookies or mint candy tends to improve memory recall.
d. Eating nothing is associated with poor concentration.
e. Eating mint-flavored candy will always improve memory recall.

Free-Response Questions

1. Ryan Greene noticed an ad for an Internet dating service that claimed more people who used its service were in long-term relationships than were people who didn’t use the service. Ryan, a good critical thinker, knows this isn’t enough to claim that the service causes people to find long-term love, and he wants to create an experiment to investigate. Use the following terms to describe an experiment that would support or dispute the ad’s claim.

- Hypothesis
- Random sample
- Random assignment
- Operational definitions
- Independent variable
- Dependent variable
- Inferential statistics

Rubric for Free-Response Question 1

1 point: The hypothesis in this context is that the Internet dating service causes (or leads to) long-term relationships. Page 42

1 point: Since the population of interest for this study should be people who are looking for long-term relationships, selecting a random sample of adults seeking relationships would help assure that the conclusions could be fairly generalized to the dating public. Page 47

1 point: In this case, participants should be randomly assigned to use of the Internet service (the experimental group) or not (the control group). Page 54

1 point: Ryan would need to operationally define what is meant by use of the Internet service, possibly including a precise number of visits to the website or time spent on the website. The phrase *long-term relationship* would also need an operational definition, possibly by the number of months together or a formal commitment (like engagement or marriage). Page 42

1 point: In Ryan's study, the use of the online dating service is the independent variable. Page 55

1 point: The number of long-term relationships is the dependent variable. Page 56

1 point: Ryan will need to calculate statistical significance for the experimental findings. In order to claim support for the hypothesis, the results need to show that there is no more than a 5 percent chance the findings are due to chance. Page 70

2. Dr. Tabor wanted to investigate the relationship between sleep and levels of alertness. She gave surveys to 150 college freshmen in her introduction to psychology course, asking them to report how many hours they slept each night during a 2-week period. Each day at the end of class, Dr. Tabor also had the participants rate their level of alertness on a scale of 1 to 10, with 10 being the most alert. Dr. Tabor compared the average amount of sleep reported by each participant along with their average score on the alertness scale on a graph to examine the data. The resulting correlation coefficient for Dr. Tabor’s data was +0.89. Explain how each of the following concepts might apply to Dr. Tabor’s research.

- Random sample
- Scatterplot
- Wording effects
- Positive correlation
- Operational definition

(5 points)

3. Dr. Pauling wanted to study whether vitamin C affects self-esteem. He recruited 200 people who came to his lab. Participants were told that they were about to take part in a harmless research study, and they needed to sign a release form in case there were harmful side effects from the vitamin C pills. The 100 participants on the right side of the room received a pill with vitamin C and the others on the left received a pill with caffeine. Dr. Pauling then gave each group a list of questions to answer in essay form about their self-esteem. When they were finished, he thanked the participants and sent them on their way. After compiling his findings, Dr. Pauling printed the names of the students and their results in the campus newspaper so they would know the results of the test. Dr. Pauling concluded that vitamin C had a positive effect on self-esteem. Identify five ethical violations in Dr. Pauling’s study.

(5 points)

UNIT III Biological Bases of Behavior

Kris Timken/Getty Images

MODULES

9 Biological Psychology and Neurotransmission

10 The Nervous and Endocrine Systems

11 Studying the Brain, Older Brain Structures, and the Limbic System

12 The Cerebral Cortex

13 Brain Hemisphere Organization and the Biology of Consciousness

14 Behavior Genetics: Predicting Individual Differences

15 Evolutionary Psychology: Understanding Human Nature

A Chinese transplant surgeon, Xiaoping Ren, is building an international team that hopes to undertake a really, really bold medical venture—a full-body transplant (Kean, 2016; Tatlow, 2016). Wang Huanming, who is paralyzed from the neck down, has volunteered to become one of ten volunteers for this mind-boggling experiment, which would transfer his head to a brain-dead person's still-functioning body.

Ignore for the moment the experiment's serious ethical issues, including the likelihood of Wang's death and the seeming impossibility of precisely connecting the head-to-spinal-cord nerves. Imagine, just imagine, that the procedure could work. With the same brain and a new body, would Wang still be Wang? After recovering, to whose home should he return? If the old Wang was once a skilled musician, would the new Wang conceivably retain that skill—or would that depend on the new body's muscle memories? And if he (assuming the new body was male) later had a child, whom should the birth certificate list as the father?

Most of us twenty-first-century people (you, too?) presume that, even with a new body, Wang would still be Wang. We presume that our brain, designed by our genes and sculpted by our experience, provides our identity and enables our mind. No brain, no mind.

We are, indeed, living brains, but more. We are bodies alive. No principle is more central to today's psychology, or to this book, than this: *Everything psychological is simultaneously biological.* Your every idea, every mood, every urge is a biological happening. You love, laugh, and cry with your body. To think, feel, or act without a body would be like running without legs. Without your body—your genes, your nervous system, your hormones, your appearance—you truly would be nobody. Moreover, your body and its brain influence and are influenced by your experience. Throughout this book, you will find many examples of the interplay between biology and psychology.

As you will also see repeatedly throughout this book, we humans share the same basic biological design. Yet thanks to our individual genes and experience, we differ from one another. Our traits and behaviors arise from the interaction of nature and nurture. Our thoughts, feelings, and actions influence our blood pressure, hormones, health—and our brain. As we travel from cradle to grave, our biology changes in response to our behaviors and environments.

In this unit, we explore the mind’s biology. We start small and build from the bottom up—from nerve cells up to the brain, and then to the environmental influences that interact with our biology. We will also work from the top down, as we consider how our thinking and emotions influence our brain and our health. And we’ll consider the brain’s ability to rewire itself as it adapts to experience and injury. Life changes us. You’ve heard it before and you’ll hear it again: *Nurture works on what nature provides.*

▶ **Unit III Overview Video**

Module 9 Biological Psychology and Neurotransmission

LEARNING TARGETS

- 9-1 Explain why psychologists are concerned with human biology.
- 9-2 Describe the parts of a neuron, and explain how neural impulses are generated.
- 9-3 Describe how nerve cells communicate with other nerve cells.
- 9-4 Describe how neurotransmitters influence behavior, and explain how drugs and other chemicals affect neurotransmission.

Biology, Behavior, and Mind

9-1 Why are psychologists concerned with human biology?

Our understanding of how the brain gives birth to the mind has come a long way. The ancient Greek physician Hippocrates correctly located the mind in the brain. His contemporary, the philosopher Aristotle, believed the mind was in the heart, which pumps warmth and vitality to the body. The heart remains our symbol for love, but science has long since overtaken philosophy on this issue: It’s your brain, not your heart, that falls in love.

In the early 1800s, German physician Franz Gall proposed that *phrenology*, studying bumps on the skull, could reveal a person’s underlying brain size and associated mental abilities and character traits (**Figure 9.1**). At one point, Britain had 29 phrenological societies, and phrenologists traveled North America giving skull readings (Dean, 2012; Hunt, 1993). Using a false name, humorist Mark Twain put one famous phrenologist to the test. “He found a cavity [and] startled me by saying that that cavity represented the total absence of the sense of humor!” Three months later, Twain sat for a second reading, this time identifying himself. Now “the cavity was gone, and in its place was . . . the loftiest bump of humor he had ever encountered in his life-long experience!” (Lopez, 2002). Although its initial popularity faded, the “science” of phrenology remains known today as a reminder of our need for critical thinking and scientific analysis. Phrenology did at least succeed in focusing attention on the *localization of function*—the idea that various brain regions have particular functions.

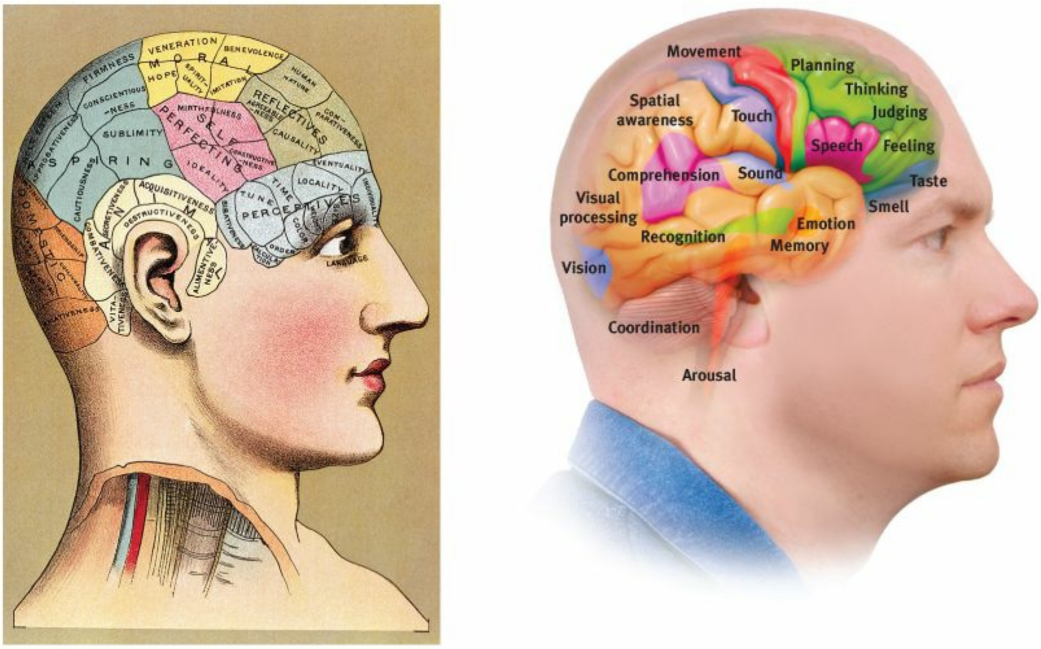
VENERATION
BENEVOLENCE
MORAL
HOPE
FIRMNESS
CONSCIENTIOUSNESS
SUBLIMITY
ASPIRING
SELF
PERFECTING
REFLECTIVES
CAUSALITY
IDEALITY
ACQUISITIVENESS
PERCEPTIVES
LOCALITY
TIME
LANGUAGE
DOMESTIC
Movement
Planning
Thinking
Judging
Spatial awareness
Touch
Speech
Feeling
Comprehension
Sound
Taste
Smell
Visual processing
Emotion
Recognition
Memory
Vision
Coordination
Arousal

Figure 9.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Bettmann/Getty Images

Figure 9.1 A wrongheaded theory

Despite initial acceptance of Franz Gall's speculations (far left), bumps on the skull tell us nothing about the brain's underlying functions. Nevertheless, some of his assumptions have held true. Though they are not the functions Gall proposed, different parts of the brain do control different aspects of behavior, as suggested here (near left; from *The Human Brain Book*) and as you will see throughout this unit.

AP® EXAM TIP

There is a ton of vocabulary in this unit and in psychology. However, learning vocabulary is really not so hard: The secret is to work on it every day. Try flash cards. Work with a study buddy. Impress your nonpsych friends with your new vocabulary. Just don't leave it until the night before the test. If you rehearse the vocabulary throughout the unit, you will do better on the unit test. Don't just reread the flash cards, but rather quiz yourself on them or paraphrase them in your own words. The big bonus is that you will also retain far more information for the AP® exam.

Today, we are living in a time Gall could only dream about. Biological psychologists use advanced technologies to study the links between biological (genetic, neural, hormonal) processes and psychological processes. They and other researchers working from a biological perspective are announcing discoveries about the interplay of our biology and our behavior and mind at an exhilarating pace. Within little more than the past century, researchers seeking to understand the biology of the mind have discovered that

- our adaptive brain is wired by our experiences.
- among the body's cells are nerve cells that conduct electricity and "talk" to one another by sending chemical messages across a tiny gap that separates them.
- specific brain systems serve specific functions (though not the functions Gall supposed).
- we integrate information processed in these different brain systems to construct our experience of sights and sounds, meanings and memories, pain and passion.

> “*If I were a college student today, I don't think I could resist going into neuroscience.*”
>
> *Novelist Tom Wolfe, 2004*

We have also realized that we are each a system composed of subsystems that are in turn composed of even smaller subsystems. Tiny cells organize to form body organs. These organs form larger systems for digestion, circulation, and information processing. And those systems are part of an even larger system—the individual, who in turn is a part of a family, culture, and community. Thus, we are *biopsychosocial* systems. To understand our behavior, we need to study how these biological, psychological, and social systems work and interact.

✓ Check Your Understanding

Ask Yourself

- What do you think early philosophers and nineteenth-century physicians would have made of recent discoveries by biological psychologists? What might have surprised them the most?

Test Yourself

- What do phrenology and biological psychology have in common?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Neural Communication

For scientists, it is a happy fact of nature that the information systems of humans and other animals operate similarly—so much so that you could not distinguish between small samples of brain tissue from a human and a monkey. This similarity allows researchers to study relatively simple animals, such as squids and sea slugs, to understand the neural systems we are about to explore. It allows them to study other mammals' brains to understand the organization of our own. Cars differ, but all have engines, accelerators, steering wheels, and brakes. A space alien could study any one of them and grasp the operating principles. Likewise, animals differ, yet their nervous systems operate similarly.

Neurons

9-2 What are the parts of a neuron, and how are neural impulses generated?

Our body's neural information system is complexity built from simplicity. Its building blocks are **neurons**, or nerve cells. Throughout life, new neurons are born and unused neurons wither away (O'Leary et al., 2014; Shors, 2014). To fathom our thoughts and actions, our memories and moods, we must first understand how neurons work and communicate.

neuron

a nerve cell; the basic building block of the nervous system.

Neurons differ, but all are variations on the same theme (**Figure 9.2**). Each consists of a **cell body** and its branching fibers. The often bushy **dendrite** fibers receive and integrate information, conducting it toward the cell body (Stuart & Spruston, 2015). From there, the cell's single lengthy **axon** fiber passes the message through its terminal branches to other neurons or to muscles or glands (**Figure 9.3**). Dendrites listen. Axons speak.

cell body

the part of a neuron that contains the nucleus; the cell’s life-support center.

dendrites

a neuron’s often bushy, branching extensions that receive and integrate messages, conducting impulses toward the cell body.

axon

the neuron extension that passes messages through its branches to other neurons or to muscles or glands.

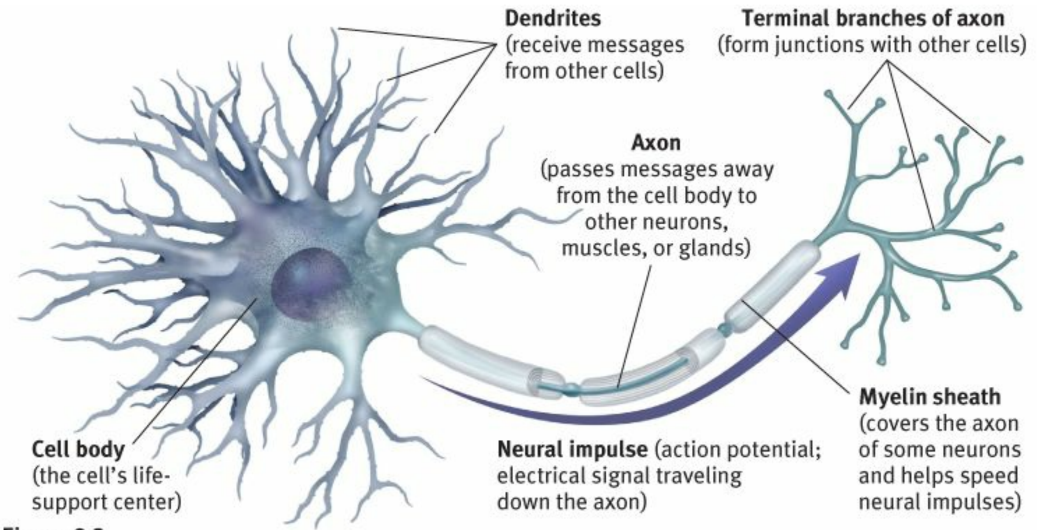
Dendrites (receive messages from other cells)
Terminal branches of axon (form junctions with other cells)
Axon (passes messages away from the cell body to other neurons, muscles, or glands)
Myelin sheath (covers the axon of some neurons and helps speed neural impulses)
Cell body (the cell’s life-support center)
Neural impulse (action potential; electrical signal traveling down the axon)

Figure 9.2
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 9.2 **A motor neuron**

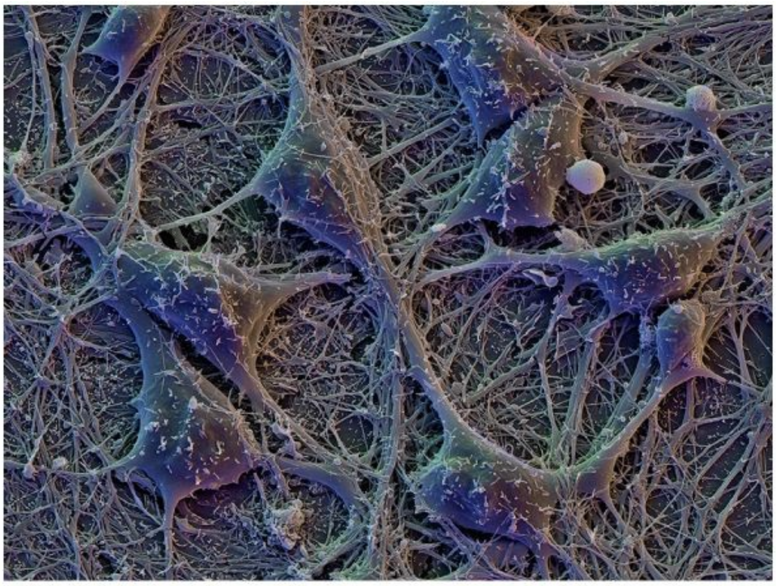

Figure 9.3
David Scharf/Science Source

Figure 9.3 Neurons communicating

When we learn about neurons, we often see them one at a time to learn their parts. But our billions of neurons exist in a vast and densely interconnected web. One neuron's terminal branches send messages to neighboring dendrites. Read on to learn more about this complex and fascinating electrochemical communication process.

Unlike the short dendrites, axons may be very long, projecting several feet through the body. A human neuron carrying orders to a leg muscle, for example, has a cell body and axon roughly on the scale of a basketball attached to a 4-mile-long rope. Much as home electrical wire is insulated, some axons are encased in a **myelin sheath**, a layer of fatty tissue that insulates them and speeds their impulses. As myelin is laid down up to about age 25, neural efficiency, judgment, and self-control grow (Fields, 2008). If the myelin sheath degenerates, *multiple sclerosis* results: Communication to muscles slows, with eventual loss of muscle control.

myelin [MY-uh-lin] sheath

a fatty tissue layer segmentally encasing the axons of some neurons; enables vastly greater transmission speed as neural impulses hop from one node to the next.

Supporting these billions of nerve cells are spidery **glial cells** (“glue cells”). Neurons are like queen bees; on their own they cannot feed or sheathe themselves. Glial cells are worker bees. They provide nutrients and insulating myelin, guide neural connections, and mop up ions and neurotransmitters. Glia also play a role in learning, thinking, and memory. By “chatting” with neurons, they participate in information transmission and memory (Fields, 2011, 2013; Martin et al., 2015).

glial cells (glia)

cells in the nervous system that support, nourish, and protect neurons; they also play a role in learning, thinking, and memory.

In more complex animal brains, the proportion of glia to neurons increases. A postmortem analysis of Albert Einstein’s brain did not find more or larger-than-usual neurons, but it did reveal a much greater concentration of glial cells than found in an average Albert’s head (Fields, 2004).

The Neural Impulse

▶ Flip It Video: Action Potential

Neurons transmit messages when stimulated by our senses or by neighboring neurons. A neuron sends a message by firing an impulse, called the **action potential**—a brief electrical charge that travels down its axon.

action potential

a neural impulse; a brief electrical charge that travels down an axon.

Depending on the type of fiber, a neural impulse travels at speeds ranging from a sluggish 2 miles (3 kilometers) per hour to more than 200 miles (320 kilometers) per hour. But even its top speed is 3 million times slower than that of electricity through a wire. We measure brain activity in milliseconds (thousandths of a second) and computer activity in nanoseconds (billionths of a second). Thus, unlike the nearly instantaneous reactions of a computer, your reaction to a sudden event, such as a book slipping off your desk during class, may take a quarter-second or more. Your brain is vastly more complex than a computer, but slower at executing simple responses. And if you were an elephant—whose round-trip message travel time from a yank on the tail to the brain and back to the tail is 100 times longer than that of a tiny shrew—your reflexes would be slower yet (More et al., 2010).

> “*I sing the body electric.*”
>
> *Walt Whitman, “Children of Adam,” 1855*

Like batteries, neurons generate electricity from chemical events. In the neuron’s chemistry-to-electricity process, *ions* (electrically charged atoms) are exchanged. The fluid outside an axon’s membrane has mostly positively charged sodium ions. A resting axon’s fluid interior (which includes both large, negatively charged protein ions and smaller, positively charged potassium ions) has a mostly negative charge. Like a tightly guarded facility, the axon’s surface is selective about what it allows through its gates. We say the axon’s surface is *selectively permeable.* This positive-outside/negative-inside state is called the *resting potential.*

When a neuron fires, however, the security parameters change: The first section of the axon opens its gates, rather like a sewer cover flipping open, and positively charged sodium ions (attracted to the negative interior) flood in through the now-open channels (**Figure 9.4**). The loss of the inside/outside charge difference, called *depolarization*, causes the next section of axon channels to open, and then the next, like falling dominos. This temporary inflow of positive ions is the neural impulse—the action potential. Each neuron is itself a miniature decision-making device performing complex calculations as it receives signals from hundreds, even thousands, of other neurons. The mind boggles when imagining this electrochemical process repeating up to 100 or even 1000 times a second. But this is just the first of many astonishments.

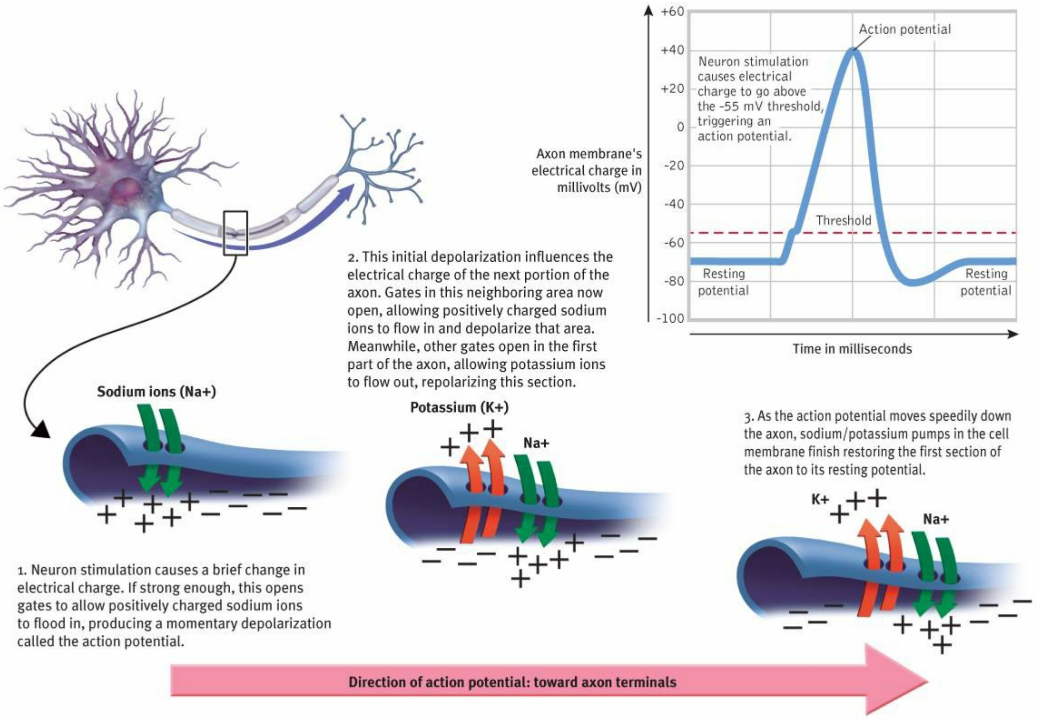
+60
+40
+20
0
-20
-40
-60
-80
-100
Axon membrane's electrical charge in millivolts (mV)
Action potential
Neuron stimulation causes electrical charge to go above the -55 mV threshold, triggering an action potential.
Threshold
Resting potential
Resting potential
Time in milliseconds
Sodium ions (Na+)
Potassium (K+)
Na+
K+
Na+
1. Neuron stimulation causes a brief change in electrical charge. If strong enough, this opens gates to allow positively charged sodium ions to flood in, producing a momentary depolarization called the action potential.
2. This initial depolarization influences the electrical charge of the next portion of the axon. Gates in this neighboring area now open, allowing positively charged sodium ions to flow in and depolarize that area. Meanwhile, other gates open in the first part of the axon, allowing potassium ions to flow out, repolarizing this section.
3. As the action potential moves speedily down the axon, sodium/potassium pumps in the cell membrane finish restoring the first section of the axon to its resting potential.
Direction of action potential: toward axon terminals

Figure 9.4
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Figure 9.4 Action potential

Bodily sensations and actions—detecting a hug or kicking a soccer ball—happen when our neurons are stimulated enough that their membrane's electrical charge reaches a threshold (−55 mV in this example—see graph above). This prompts each of those neurons to "fire" an impulse—an action potential—which travels down its axon (see numbered drawings above) and transmits a message to other neurons, muscles, or glands.

Most neural signals are *excitatory*, somewhat like pushing a neuron's gas pedal. Some are *inhibitory*, more like pushing its brake. If excitatory signals exceed the inhibitory signals by a minimum intensity, or **threshold** (see Figure 9.4), the combined signals trigger an action potential. Think of it as a class vote: If the excitatory people with their hands up outvote the inhibitory people with their hands down, then the vote passes. The action potential then travels down the axon, which branches into junctions with hundreds or thousands of other neurons or with the body’s muscles and glands.

threshold

the level of stimulation required to trigger a neural impulse.

Neurons need short breaks (a tiny fraction of an eyeblink). During a resting pause called the **refractory period**, subsequent action potentials cannot occur until the axon returns to its resting state. Then the neuron can fire again.

refractory period

in neural processing, a brief resting pause that occurs after a neuron has fired; subsequent action potentials cannot occur until the axon returns to its resting state.

Increasing the level of stimulation above the threshold will not increase the neural impulse’s intensity. The neuron’s reaction is an **all-or-none response**: Like guns, neurons either fire or they don’t. How, then, do we detect the intensity of a stimulus? How do we distinguish a gentle touch from a big hug? A strong stimulus can trigger *more* neurons to fire, and to fire more often. But it does not affect the action potential’s strength or speed. Squeezing a trigger harder won’t make a bullet go faster.

all-or-none response

a neuron’s reaction of either firing (with a full-strength response) or not firing.

> “*What one neuron tells another neuron is simply how much it is excited.*”
>
> *Francis Crick,* The Astonishing Hypothesis, *1994*

✓ Check Your Understanding

Ask Yourself

- Does it surprise you to learn that despite your brain’s complexity, your reaction time is slower than a computer’s? What does this tell you about which tasks might be more readily performed by humans versus computers?

Test Yourself

- When a neuron fires an action potential, the information travels through the axon, the dendrites, and the cell body, but not in that order. Place these three structures in the correct order.
- How does our nervous system allow us to experience the difference between a slap and a tap on the back?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

How Neurons Communicate

9-3 How do nerve cells communicate with other nerve cells?

Neurons interweave so intricately that even with a microscope, you would have trouble seeing where one neuron ends and another begins. Scientists once believed that the axon of one cell fused with the dendrites of another in an uninterrupted fabric. Then British physiologist Sir Charles Sherrington (1857–1952) noticed that neural impulses were taking an unexpectedly long time to travel a neural pathway. Inferring that there must be a brief interruption in the transmission, Sherrington called the meeting point between neurons a **synapse**.

synapse [SIN-aps]
the junction between the axon tip of the sending neuron and the dendrite or cell body of the receiving neuron. The tiny gap at this junction is called the *synaptic gap* or *synaptic cleft.*

AP® EXAM TIP

Note the important shift here. So far, you have been learning about how just one neuron operates. The action potential is the mechanism for communication *within* a single neuron. Now you are moving on to a discussion of two neurons and how communication occurs *between* them—very different, but equally important. Both ideas are important for the AP® exam.

We now know that the axon terminal of one neuron is in fact separated from the receiving neuron by a tiny *synaptic gap* (or *synaptic cleft*). Spanish anatomist Santiago Ramón y Cajal (1852–1934) marveled at these near-unions of neurons, calling them “protoplasmic kisses.” “Like elegant ladies air-kissing so as not to muss their makeup, dendrites and axons don’t quite touch,” noted poet Diane Ackerman (2004, p. 37). How do the neurons execute this protoplasmic kiss, sending information across the synaptic gap? The answer is one of the important scientific discoveries of our age.

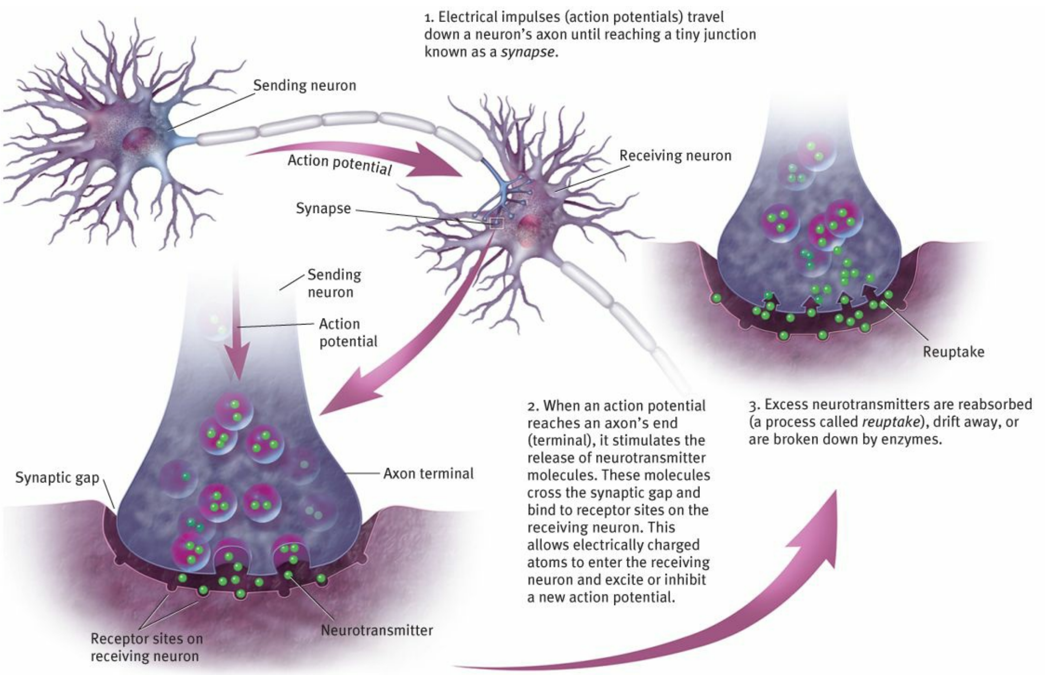
When an action potential reaches the knob-like terminals at an axon’s end, it triggers the release of chemical messengers, called **neurotransmitters** (**Figure 9.5**). Within 1/10,000th of a second, the neurotransmitter molecules cross the synaptic gap and bind to receptor sites on the receiving neuron—as precisely as a key fits a lock. For an instant, the neurotransmitter unlocks tiny channels at the receiving site, and electrically charged atoms flow in, exciting or inhibiting the receiving neuron’s readiness to fire. The excess neurotransmitters finally drift away, are broken down by enzymes, or are reabsorbed by the sending neuron—a process called **reuptake**. Some antidepressant medications work by partially blocking the reuptake of mood-enhancing neurotransmitters (**Figure 9.6**).

neurotransmitters

chemical messengers that cross the synaptic gaps between neurons. When released by the sending neuron, neurotransmitters travel across the synapse and bind to receptor sites on the receiving neuron, thereby influencing whether that neuron will generate a neural impulse.

reuptake

a neurotransmitter’s reabsorption by the sending neuron.


Sending neuron
Action potential
Receiving neuron
Synapse
Sending neuron
Action potential
Reuptake
Synaptic gap
Axon terminal
Receptor sites on receiving neuron
Neurotransmitter

1. Electrical impulses (action potentials) travel down a neuron’s axon until reaching a tiny junction known as a *synapse*.

2. When an action potential reaches an axon’s end (terminal), it stimulates the release of neurotransmitter molecules. These molecules cross the synaptic gap and bind to receptor sites on the receiving neuron. This allows electrically charged atoms to enter the receiving neuron and excite or inhibit a new action potential.

3. Excess neurotransmitters are reabsorbed (a process called *reuptake*), drift away, or are broken down by enzymes.

Figure 9.5
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Figure 9.5 How neurons communicate

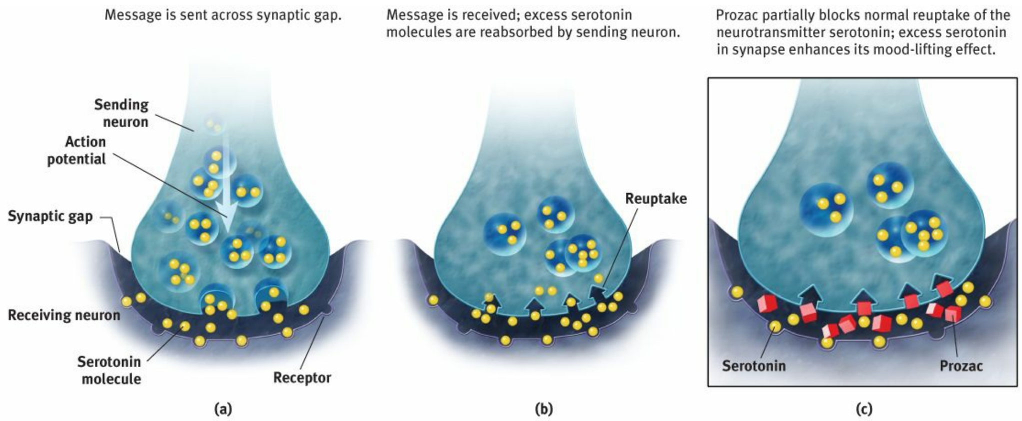
Message is sent across synaptic gap.
Message is received; excess serotonin molecules are reabsorbed by sending neuron.
Prozac partially blocks normal reuptake of the neurotransmitter serotonin; excess serotonin in synapse enhances its mood-lifting effect.
Sending neuron
Action potential
Synaptic gap
Receiving neuron
Serotonin molecule
Receptor
Reuptake
Serotonin
Prozac
(a)
(b)
(c)

Figure 9.6
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 9.6 Biology of antidepressants

Selective serotonin reuptake inhibitors (SSRIs) are popularly prescribed antidepressants. They relieve depression by partially blocking the reuptake of the neurotransmitter serotonin. Shown here is the action of the SSRI Prozac.

> “*All information processing in the brain involves neurons ‘talking to’ each other at synapses.*”
>
> *Neuroscientist Solomon H. Snyder (1984)*

✓ Check Your Understanding

Ask Yourself

- Why was the discovery of neurons’ communication mechanism so important?

Test Yourself

- What happens in the *synaptic gap?*
- What is reuptake? What two other things can happen to excess neurotransmitters after a neuron reacts?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

How Neurotransmitters Influence Us

9-4 How do neurotransmitters influence behavior, and how do drugs and other chemicals affect neurotransmission?

In their quest to understand neural communication, researchers have discovered several dozen neurotransmitters and as many new questions: Are certain neurotransmitters found only in specific places? How do neurotransmitters affect our moods, memories, and mental abilities? Can we boost or diminish these effects through drugs or diet?

> “*When it comes to the brain, if you want to see the action, follow the neurotransmitters.*”
>
> *Neuroscientist Floyd Bloom (1993)*

Later modules explore neurotransmitter influences on hunger and thinking, depression and euphoria, addictions and therapy. For now, let’s glimpse how neurotransmitters influence our motions and emotions. A particular brain pathway may use only one or two neurotransmitters, such as serotonin and dopamine, and particular neurotransmitters affect specific behaviors and emotions (**Table 9.1**). But neurotransmitter systems don’t operate in isolation; they interact, and their effects vary with the receptors they stimulate (**Figure 9.7**).

TABLE 9.1 Some Neurotransmitters and Their Functions

Neurotransmitter	Function	Examples of Malfunctions
Acetylcholine (ACh)	Enables muscle action, learning, and memory	With Alzheimer’s disease, ACh-producing neurons deteriorate.
Dopamine	Influences movement, learning, attention, and emotion	Oversupply linked to schizophrenia. Undersupply linked to tremors and decreased mobility in Parkinson’s disease.
Serotonin	Affects mood, hunger, sleep, and arousal	Undersupply linked to depression. Some drugs that raise serotonin levels are used to treat depression.
Norepinephrine	Helps control alertness and arousal	Undersupply can depress mood.
GABA (gamma-aminobutyric acid)	A major inhibitory neurotransmitter	Undersupply linked to seizures, tremors, and insomnia.
Glutamate	A major	Oversupply can overstimulate the

	excitatory neurotransmitter; involved in memory	brain, producing migraines or seizures (which is why some people avoid MSG, monosodium glutamate, in food).
Endorphins	Neurotransmitters that influence the perception of pain or pleasure	Oversupply with opiate drugs can suppress the body’s natural endorphin supply.

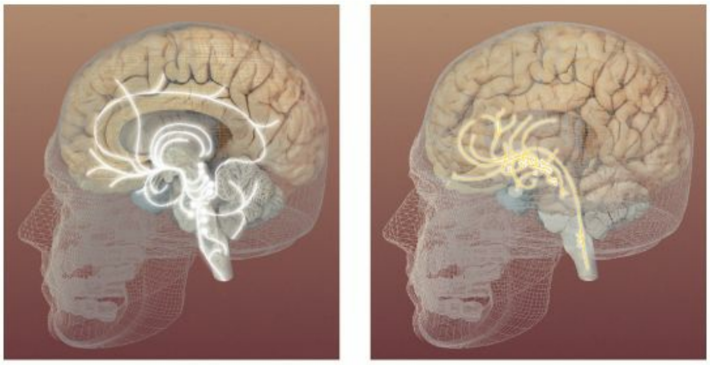

Figure 9.7
Mapping the Mind, Rita Carter, 1989 Moonrunner Ltd.

Figure 9.7 Neurotransmitter pathways

Each of the brain’s differing chemical messengers has designated pathways where it operates, as shown here for serotonin and dopamine (Carter, 1998).

One of the best-understood neurotransmitters, *acetylcholine (ACh),* plays a role in learning and memory. It is also the messenger at every junction between motor neurons (which carry information from the brain and spinal cord to the body’s tissues) and skeletal muscles. When ACh is released to our muscle cell receptors, the muscle contracts. If ACh transmission is blocked, as happens during some kinds of anesthesia and with some poisons, the muscles cannot contract and we are paralyzed.

Researchers made an exciting discovery about neurotransmitters when they attached a radioactive tracer to morphine, an opiate drug that elevates mood and eases pain (Pert & Snyder, 1973). (Radioactive tracers send out harmless but detectable energy as they pass through the body.) As the researchers tracked the morphine in an animal’s brain, they noticed it was binding to receptors in areas linked with mood and pain sensations. But why would the brain have these “opiate receptors”? Why would it have a chemical lock, unless it also had a key—a natural painkiller—to open it?

AP® EXAM TIP

As the text indicates, there are dozens of different neurotransmitters. Though there’s no way to predict exactly which ones you’ll see on the AP® exam, it’s quite possible you will be asked about the neurotransmitters in Table 9.1.

Top: Noam Galai/Getty Images, Bottom: RICHARD DREW/AP Images

Dependent upon dopamine The neurotransmitter dopamine helps us move, think, and feel. Too much increases the odds of developing schizophrenia; too little may produce the tremors and loss of motor control of Parkinson’s disease

(NIH, 2016). Approximately 7 million people worldwide have Parkinson’s disease (de Lau & Breteler, 2006). Well-known people diagnosed with the disease include actor Michael J. Fox (top photo), and the late boxing legend Muhammad Ali (bottom photo).

Researchers soon confirmed that the brain does indeed produce its own naturally occurring opiates. Our body releases several types of neurotransmitter molecules similar to morphine in response to pain and vigorous exercise. These **endorphins** (short for *endogenous* [produced within] *morphine*) help explain good feelings such as the “runner’s high,” the painkilling effects of acupuncture, and the indifference to pain in some severely injured people (Boecker et al., 2008; Fuss et al., 2015). But once again, new knowledge led to new questions.

endorphins [en-DOR-fins]

“morphine within”—natural, opiate-like neurotransmitters linked to pain control and to pleasure.

How Drugs and Other Chemicals Alter Neurotransmission

If natural endorphins lessen pain and boost mood, why not increase this effect by flooding the brain with artificial opiates, thereby intensifying the brain’s own “feel-good” chemistry? Because it would disrupt the brain’s chemical balancing act. When flooded with opiate drugs such as heroin and morphine, the brain maintains its chemical balance by suppressing its own natural opiates. When the drug is withdrawn, the brain may then be deprived of any form of opiate, causing intense discomfort. For suppressing the body’s own neurotransmitter production, nature charges a price.

AP® EXAM TIP

Be very clear on this. Neurotransmitters are produced inside the body. They can excite and inhibit neural communication. Drugs and other chemicals come from outside the body. They can have an agonistic effect or an antagonistic effect on neurotransmission. Students have confused these concepts on the AP® exam.

Drugs and other chemicals affect brain chemistry, often by either exciting or inhibiting neurons’ firing (**Figure 9.8**). **Agonist** molecules *increase* a neurotransmitter’s action. Some agonists may increase the production or release of neurotransmitters, or block reuptake in the synapse. Other agonists may be similar enough to a neurotransmitter to bind to its receptor and mimic its excitatory or inhibitory effects. Some opiate drugs are agonists and produce a temporary “high” by amplifying normal sensations of arousal or pleasure.

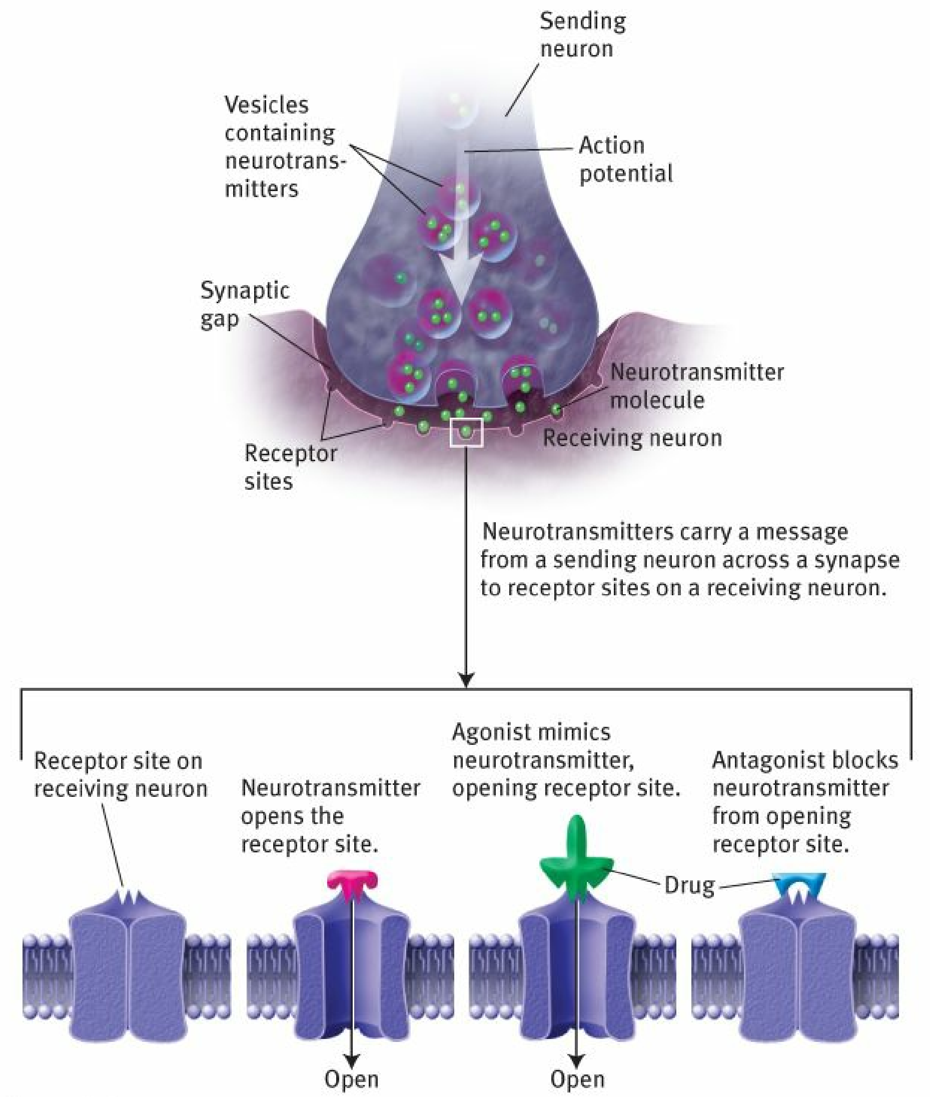
Sending neuron
Vesicles containing neurotrans-mitters
Action potential
Synaptic gap
Neurotransmitter molecule
Receiving neuron
Receptor sites
Neurotransmitters carry a message from a sending neuron across a synapse to receptor sites on a receiving neuron.
Receptor site on receiving neuron
Neurotransmitter opens the receptor site.
Agonist mimics neurotransmitter, opening receptor site.
Antagonist blocks neurotransmitter from opening receptor site.
Drug
Drug
Open
Open

Figure 9.8
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Art adapted from Higgins & George, 2007.

Figure 9.8 Agonists and antagonists

Curare poisoning paralyzes its victims by blocking ACh receptors involved in muscle movements. Morphine mimics endorphin actions. Which is an agonist, and which is an antagonist?[1]

agonist

a molecule that increases a neurotransmitter’s action.

Antagonists *decrease* a neurotransmitter’s action by blocking production or release. Botulin, a poison that can form in improperly canned food, causes paralysis by blocking ACh release. (Small injections of botulin—Botox—smooth wrinkles by paralyzing the underlying facial muscles.) These antagonists are enough like the natural neurotransmitter to occupy its receptor site and block its effect but are not similar enough to stimulate the receptor (rather like foreign coins that fit into, but won’t operate, a candy machine). Curare, a poison some South American Indians have applied to hunting-dart tips, occupies and blocks ACh receptor sites on muscles, producing paralysis in their prey.

antagonist

a molecule that inhibits or blocks a neurotransmitter’s action.

✓ Check Your Understanding

Ask Yourself

- Can you recall a time, perhaps after a workout, when you felt the effects of endorphins? How would you describe these feelings?

Test Yourself

- Serotonin, dopamine, and endorphins are all chemical messengers called

____________________.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 9 REVIEW

9-1 Why are psychologists concerned with human biology?

- Researchers working from a *biological* perspective study the links between our biology and our behavior.
- We are biopsychosocial systems: biological, psychological, and social-cultural factors interact to influence behavior.

9-2 What are the parts of a neuron, and how are neural impulses generated?

- *Neurons* are the elementary components of the nervous system, the body's speedy electrochemical information system.
- A neuron consists of a *cell body* and its branching fibers. It receives signals through its *dendrites* and sends signals through its *axons*.
- Some axons are encased in a *myelin sheath*, which enables faster transmission.
- *Glial cells* support nerve cells and participate in learning, thinking, and memory.
- If the combined received signals exceed a minimum *threshold*, the neuron fires, transmitting an electrical impulse (the *action potential*) down its axon by means of a chemistry-to-electricity process. The neuron's reaction is an *all-or-none process*.

9-3 How do nerve cells communicate with other nerve cells?

- When action potentials reach the end of an axon (the axon terminals), they stimulate the release of *neurotransmitters*.
- These chemical messengers carry a message from the sending neuron across a *synapse* to receptor sites on a receiving neuron.
- The sending neuron, in a process called *reuptake*, then reabsorbs the

excess neurotransmitter molecules in the synaptic gap.

- If incoming signals are strong enough, the receiving neuron generates its own action potential and relays the message to other cells.

9-4 How do neurotransmitters influence behavior, and how do drugs and other chemicals affect neurotransmission?

- Neurotransmitters travel designated pathways in the brain and may influence specific behaviors and emotions.
- Acetylcholine (ACh) affects muscle action, learning, and memory.
- *Endorphins* are natural opiates released in response to pain and exercise.
- Drugs and other chemicals affect brain chemistry at synapses.
- *Agonists* excite by mimicking particular neurotransmitters or by blocking their reuptake.
- *Antagonists* inhibit a particular neurotransmitter’s release or block its effect.

Multiple-Choice Questions

1. Multiple sclerosis is a result of degeneration in the

a. dendrite.
b. axon.
c. myelin sheath.
d. terminal button.
e. neuron.

2. Following the release of neurotransmitters across the synapse, and an action potential, which of the following is most likely to take place?

a. The synaptic cleft closes temporarily to terminate the action potential.
b. The myelin sheath absorbs the excess neurotransmitters.
c. The receiving neuron absorbs the neurotransmitter to send to the next neuron.

d. The axon disposes of the depleted neurotransmitters.
e. The sending neuron reabsorbs the neurotransmitter for reuse.

3. In order for a neuron to generate an action potential, which of the following must be true?

a. The neuron must be in the refractory period.
b. Glial cells must release neurotransmitters into the axon.
c. Excitatory impulses must outnumber inhibitory impulses.
d. Dopamine and serotonin must be present in equal amounts.
e. Inhibitory impulses must outnumber excitatory impulses.

4. Phrenology has been discredited, but which of the following ideas has its origins in phrenology?

a. The left brain is more creative than the right brain.
b. Brain cavities contribute to sense of humor.
c. The left hemisphere lead to emotional responses.
d. Specific areas of the brain control specific functions.
e. The mind pumps warmth and vitality into the body.

5. When there is a negative charge inside an axon and a positive charge outside of it, the neuron is

a. in the process of reuptake.
b. about to begin the refractory period.
c. said to have a resting potential.
d. said to have an action potential.
e. depolarizing.

6. Morphine is similar to the body’s endorphins in that both elevate mood and ease pain. In this instance, morphine is considered to be a(n)

a. antagonist.
b. synapse.
c. ion.
d. agonist.
e. axon.

7. Neurotransmitters cross the _______________ to carry information to the next neuron.

a. synaptic gap
b. axon
c. myelin sheath
d. dendrites
e. cell body

8. Which neurotransmitters are most likely in undersupply in someone who is depressed?

a. Oxytocin and GABA
b. ACh and histamine
c. Dopamine and andenosine
d. Serotonin and norepinephrine
e. Epinephrine and glutamate

Practice FRQs

1. Karl’s doctor is concerned about a loss of neural functioning in Karl’s brain. Explain how loss of each of the following might make Karl’s reaction time slower.

- Myelin sheath
- Acetylcholine (ACh)

Answer

1 point: Damage to the myelin sheath would slow down neural impulses and cause the message to travel slower which makes the muscles move slower. Page 82

1 point: ACh is the neurotransmitter involved in muscle action. The doctor might look to see if Karl was producing enough of this neurotransmitter. Page 87

2. Explain the role each of the following plays in sending a message through a neuron.

- Dendrites
- Axon
- Myelin sheath

(3 points)

Module **10 The Nervous and Endocrine Systems**

LEARNING TARGETS

- 10-1 Describe the functions of the nervous system’s main divisions, and identify the three main types of neurons.
- 10-2 Describe the nature and functions of the endocrine system and its interaction with the nervous system.

My [DM’s] nervous system recently gave me an emotional roller-coaster ride. Before sending me into an MRI machine for a routine shoulder scan, a technician asked if I had issues with claustrophobia (fear of enclosed spaces). “No, I’m fine,” I assured her, with perhaps a hint of macho swagger. Moments later, as I found myself on my back, stuck deep inside a coffin-sized box and unable to move, my nervous system had a different idea. As claustrophobia overtook me, my heart began pounding and I felt a desperate urge to escape. Just as I was about to cry out for release, I suddenly felt my nervous system having a reverse calming influence. My heart rate slowed and my body relaxed, though my arousal surged again before the 20-minute confinement ended. “You did well!” the technician said, unaware of my roller-coaster ride.

What happens inside our brain and body to produce such surging and subsiding emotions? Is the nervous system that stirs us the same nervous system that soothes us?

The Nervous System

10-1 What are the functions of the nervous system’s main divisions, and what are the three main types of neurons?

Neurons communicating with neurotransmitters make up our body’s **nervous system**, a communication network that takes in information from the world and the body’s tissues, makes decisions, and sends back information and orders to the body’s tissues (**Figure 10.1**).

nervous system

the body’s speedy, electrochemical communication network, consisting of all the nerve cells of the peripheral and central nervous systems.

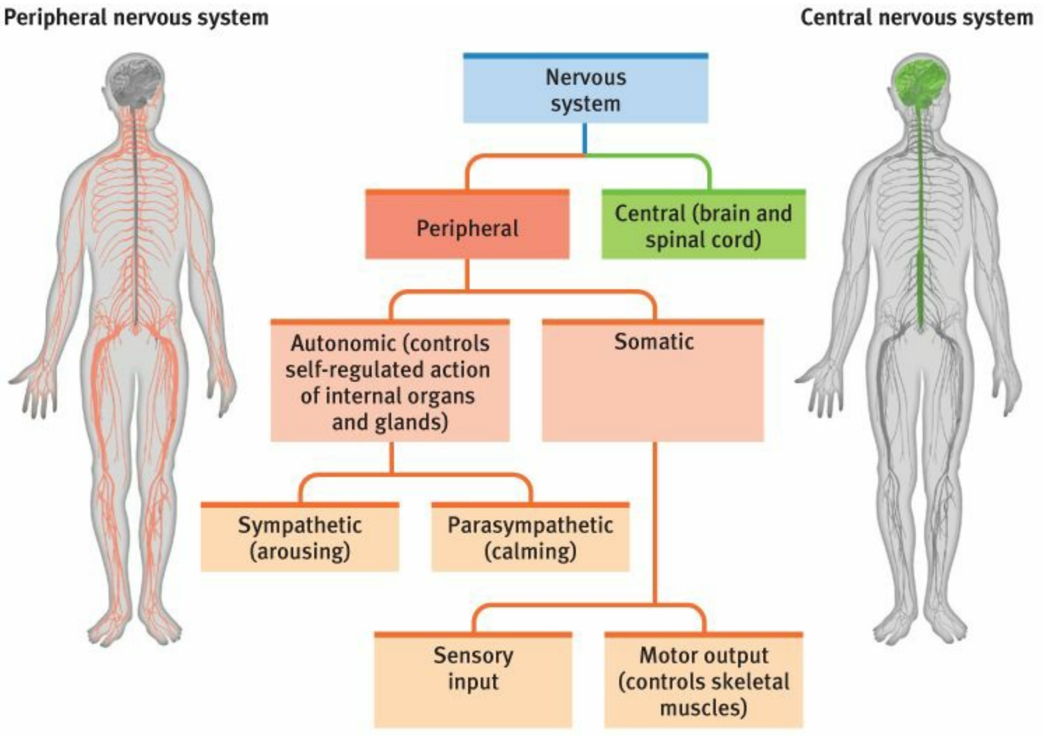
Peripheral nervous system
Central nervous system
Nervous system
Peripheral
Central (brain and spinal cord)
Autonomic (controls self-regulated action of internal organs and glands)
Somatic
Sympathetic (arousing)
Parasympathetic (calming)
Sensory input
Motor output (controls skeletal muscles)

Figure 10.1

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Figure 10.1 The functional divisions of the human nervous system

A quick overview: The brain and spinal cord form the **central nervous system (CNS)**, the body's decision maker. The **peripheral nervous system (PNS)** is responsible for gathering information and for transmitting CNS decisions to other body parts. **Nerves**, electrical cables formed from bundles of axons, link the CNS with the body's sensory receptors, muscles, and glands. The optic nerve, for example, bundles a million axons into a single cable carrying the messages from the eye to the brain (Mason & Kandel, 1991).

central nervous system (CNS)

the brain and spinal cord.

peripheral nervous system (PNS)

the sensory and motor neurons that connect the central nervous system (CNS) to the rest of the body.

nerves

bundled axons that form neural cables connecting the central nervous system with muscles, glands, and sense organs.

Information travels in the nervous system through three types of neurons. **Sensory neurons** carry messages from the body's tissues and sensory receptors inward (thus, they are *afferent*) to the brain and spinal cord for processing. **Motor neurons** (which are *efferent*) carry instructions from the central nervous system outward to the body's muscles and glands. Between the sensory input and motor output, information is processed via the **interneurons** of the spinal cord and brain. Our complexity resides mostly in these interneurons. Our nervous system has a few million sensory neurons, a few million motor neurons, and billions and billions of interneurons.

sensory (afferent) neurons

neurons that carry incoming information from the body's tissues and sensory receptors to the brain and spinal cord.

motor (efferent) neurons

neurons that carry outgoing information from the brain and spinal cord to the muscles and glands.

interneurons

neurons within the brain and spinal cord; they communicate internally and process information between the sensory inputs and motor outputs.

The Peripheral Nervous System

Our peripheral nervous system has two components—somatic and autonomic. Our **somatic nervous system** enables voluntary control of our skeletal muscles. As you reach the end of this page, your somatic nervous system will report to your brain the current state of your skeletal muscles and carry instructions back, triggering a response from your hand so you can turn the page and read on.

somatic nervous system

the division of the peripheral nervous system that controls the body's skeletal muscles. Also called the *skeletal nervous system.*

Our **autonomic nervous system (ANS)** controls our glands and our internal organ muscles. The ANS influences functions such as glandular activity, heartbeat, and digestion. (*Autonomic* means "self-regulating.") Like an automatic pilot, this system may be consciously overridden but usually operates on its own (autonomously).

autonomic [aw-tuh-NAHM-ik] nervous system (ANS)

the part of the peripheral nervous system that controls the glands and the muscles of the internal organs (such as the heart). Its sympathetic division arouses; its parasympathetic division calms.

The autonomic nervous system’s subdivisions serve two important functions (**Figure 10.2**). The **sympathetic nervous system** arouses and expends energy (think “fight or flight”). If something alarms or challenges you (such as taking the AP® Psychology exam or being stuffed in an MRI machine), your sympathetic nervous system will accelerate your heartbeat, raise your blood pressure, slow your digestion, raise your blood sugar, and cool you with perspiration, making you alert and ready for action. When the stress subsides (the AP® exam or MRI is over), your **parasympathetic nervous system** will produce the opposite effects, conserving energy as it calms you (think “rest and digest”). The sympathetic and parasympathetic nervous systems work together to keep us in a steady internal state called *homeostasis* (more on this in Module 37).

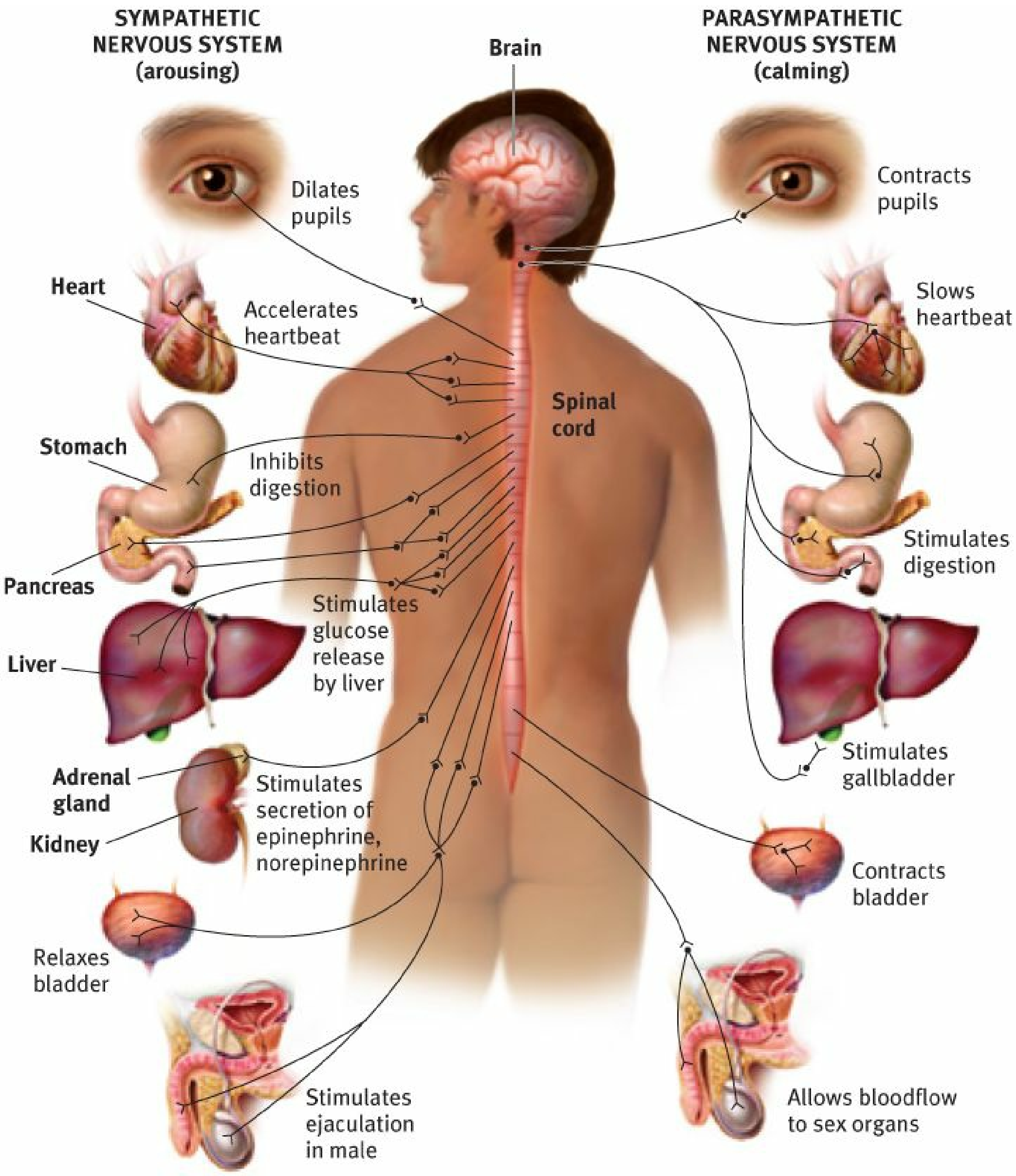

SYMPATHETIC NERVOUS SYSTEM (arousing)
Brain
PARASYMPATHETIC NERVOUS SYSTEM (calming)
Dilates pupils
Contracts pupils
Heart
Accelerates heartbeat
Slows heartbeat
Spinal cord
Stomach
Inhibits digestion
Pancreas
Stimulates digestion
Stimulates glucose release by liver
Liver
Stimulates gallbladder
Adrenal gland
Kidney
Stimulates secretion of epinephrine, norepinephrine
Contracts bladder
Relaxes bladder
Stimulates ejaculation in male
Allows bloodflow to sex organs

Figure 10.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 10.2 The dual functions of the autonomic nervous system

The autonomic nervous system controls the more autonomous (or self-regulating) internal functions. Its sympathetic division arouses and expends energy. Its parasympathetic division calms and conserves energy, allowing routine maintenance activity. For example, sympathetic stimulation accelerates heartbeat, whereas parasympathetic stimulation slows it.

Flip It Video: Structure of the Nervous System

sympathetic nervous system

the division of the autonomic nervous system that arouses the body, mobilizing its energy.

parasympathetic nervous system

the division of the autonomic nervous system that calms the body, conserving its energy.

✓ Check Your Understanding

Ask Yourself

- Have you ever felt your sympathetic nervous system kick in at a stressful moment? Were you able to sense your parasympathetic nervous system’s response when the experience ended?

Test Yourself

- Match the type of neuron to its description.

Type	Description
1. Motor neurons	a. carry incoming messages from sensory receptors to the CNS.
2. Sensory neurons	b. communicate within the CNS and process information between incoming and outgoing messages.
3. Interneurons	c. carry outgoing messages from the CNS to muscles and glands.

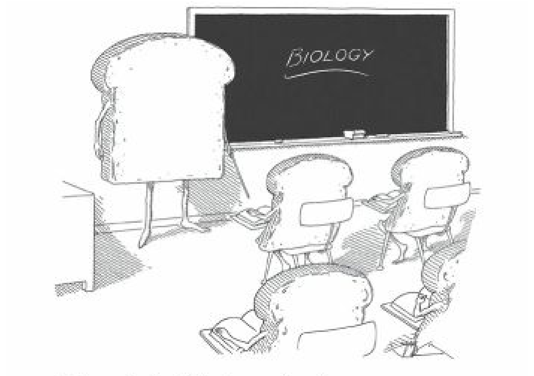
- What bodily changes does your ANS direct before and after you give an important speech?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

The Central Nervous System

From neurons “talking” to other neurons arises the complexity of the central nervous system’s brain and spinal cord.

It is the brain that enables our humanity—our thinking, feeling, and acting. Tens of billions of neurons, each communicating with thousands of other neurons, yield an ever-changing wiring diagram. By one estimate—projecting from neuron counts in small brain samples—our brain has some 86 billion neurons (Azevedo et al., 2009; Herculano-Houzel, 2012).



© Tom Swick/Cartoonstock.com

“The body is made up of millions and millions of crumbs.”

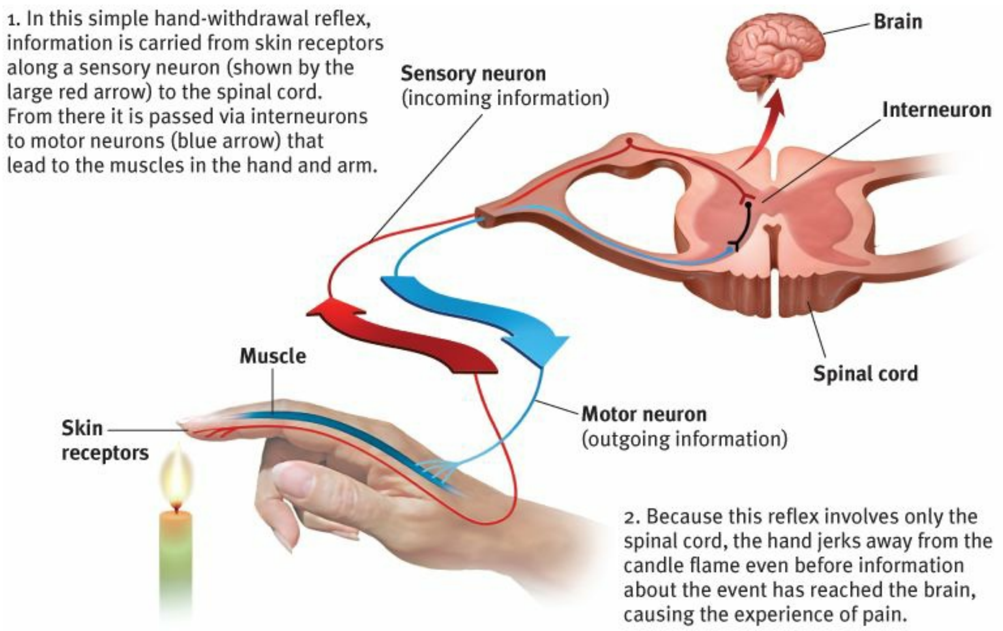
The brain’s neurons cluster into work groups called *neural networks.* To understand why, Stephen Kosslyn and Olivier Koenig (1992, p. 12) have invited us to “think about why cities exist; why don’t people distribute themselves more evenly across the countryside?” Like people networking with people, neurons network with nearby neurons with which they can have short, fast connections; each layer’s cells connect with various cells in the neural network’s next layer. Learning—to play the violin, speak a foreign language, or solve a math problem—occurs as experience strengthens connections. Neurons that fire together wire together.

The other part of the CNS, the *spinal cord*, is a two-way information highway connecting the peripheral nervous system and the brain. Ascending neural fibers send up sensory information, and descending fibers send back motor-control information. The neural pathways governing our **reflexes**, our automatic responses to stimuli, illustrate the spinal cord’s work. A simple spinal reflex pathway is composed of a single sensory neuron and a single motor neuron. These often communicate through an interneuron. The knee-jerk response, for example, involves one such simple pathway. A headless warm body could do it.

reflex

a simple, automatic response to a sensory stimulus, such as the knee-jerk response.

Another neural circuit enables the pain reflex (**Figure 10.3**). When your finger touches a flame, neural activity (excited by the heat) travels via sensory neurons to interneurons in your spinal cord. These interneurons respond by activating motor neurons leading to the muscles in your arm. Because the simple pain-reflex pathway runs through the spinal cord and right back out, your hand jerks away from the candle's flame *before* your brain receives and responds to the information that causes you to feel pain. That's why it feels as if your hand jerks away not by your choice, but on its own.



1. In this simple hand-withdrawal reflex, information is carried from skin receptors along a sensory neuron (shown by the large red arrow) to the spinal cord. From there it is passed via interneurons to motor neurons (blue arrow) that lead to the muscles in the hand and arm.

2. Because this reflex involves only the spinal cord, the hand jerks away from the candle flame even before information about the event has reached the brain, causing the experience of pain.

Figure 10.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 10.3 A simple reflex

▶ **Flip It Video: Reflex Arc**

> “*If the nervous system be cut off between the brain and other parts, the experiences of those other parts are nonexistent for the mind. The eye is blind, the ear deaf, the hand insensible and motionless.*”
>
> *William James*, The Principles of Psychology, *1890*

Information travels to and from the brain by way of the spinal cord, unless that connection becomes broken (as in the case of full-body transplant volunteer Wang Huanming). Were the top of your spinal cord severed, you would not feel pain from your paralyzed body below. Nor would you feel pleasure. With your brain literally out of touch with your body, you would lose all sensation and voluntary movement in body regions with sensory and motor connections to the spinal cord below its point of injury. You would exhibit the knee-jerk response without feeling the tap. To produce bodily pain or pleasure, the sensory information must reach the brain.

✓ Check Your Understanding

Ask Yourself

- Does our nervous system’s design—with its synaptic gaps that chemical messenger molecules cross in an imperceptibly brief instant—surprise you? Would you have designed yourself differently?

Test Yourself

- How does information flow through your nervous system as you pick up a fork? Can you summarize this process?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

The Endocrine System

10-2 What is the nature and what are the functions of the endocrine system, and how does it interact with the nervous system?

So far we have focused on the body’s speedy electrochemical information system. Interconnected with your nervous system is a second communication system, the **endocrine system** (**Figure 10.4**). The endocrine system’s glands secrete another form of chemical messengers, **hormones**, which travel through the bloodstream and affect other tissues, including the brain. When hormones act on the brain, they influence our interest in sex, food, and aggression.

endocrine [EN-duh-krin] system

the body’s “slow” chemical communication system; a set of glands that secrete hormones into the bloodstream.

hormones

chemical messengers that are manufactured by the endocrine glands, travel through the bloodstream, and affect other tissues.

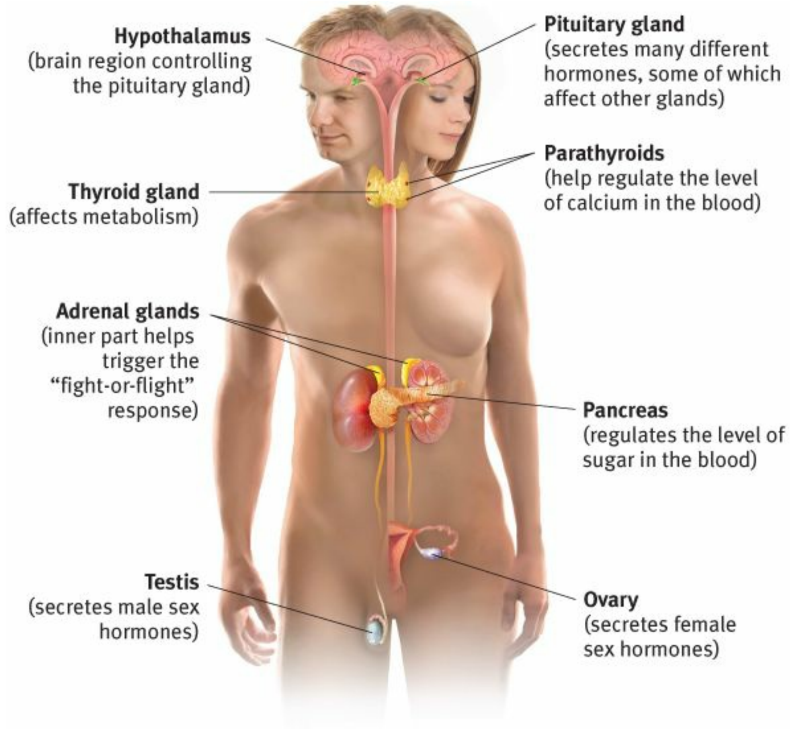

Hypothalamus
(brain region controlling the pituitary gland)
Pituitary gland
(secretes many different hormones, some of which affect other glands)
Thyroid gland
(affects metabolism)
Parathyroids
(help regulate the level of calcium in the blood)
Adrenal glands
(inner part helps trigger the "fight-or-flight" response)
Pancreas
(regulates the level of sugar in the blood)
Testis
(secretes male sex hormones)
Ovary
(secretes female sex hormones)

Figure 10.4
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 10.4 The endocrine system

Some hormones are chemically identical to neurotransmitters (the chemical messengers that diffuse across a synapse and excite or inhibit an adjacent neuron). The endocrine system and nervous system are therefore close relatives: Both produce molecules that act on receptors elsewhere. Like many relatives, they also differ. The speedier nervous system zips messages from eyes to brain to hand in a fraction of a second. Endocrine messages trudge along in the bloodstream, taking several seconds or more to travel from the gland to the target tissue. If the nervous system transmits information with text-message speed, the endocrine system delivers an old-fashioned letter.

But slow and steady sometimes wins the race. Endocrine messages tend to outlast the effects of neural messages. Have you ever felt angry long after the cause of your angry feelings was resolved (say, your friend apologized for her rudeness)? You may have experienced an "endocrine hangover" from lingering emotion-related hormones. The persistence of emotions—even without conscious awareness of what caused them—was dramatically evident in one ingenious experiment. Brain-damaged patients unable to form new conscious memories watched a sad film and later a happy film. After each viewing, they did not consciously recall the films, but the sad or happy emotion persisted (Feinstein et al., 2010).

In a moment of danger, the ANS orders the **adrenal glands** on top of the kidneys to release *epinephrine* and *norepinephrine* (also called *adrenaline* and *noradrenaline*). These hormones increase heart rate, blood pressure, and blood sugar, providing a surge of energy known as the *fight-or-flight* response. When the emergency passes, the hormones—and the feelings—linger a while.

adrenal [ah-DREEN-el] glands

a pair of endocrine glands that sit just above the kidneys and secrete hormones (epinephrine and norepinephrine) that help arouse the body in times of stress.

The most influential endocrine gland is the **pituitary gland**, a pea-sized structure located in the core of the brain, where it is controlled by an adjacent brain area, the *hypothalamus* (more on that shortly). Among the hormones released by the pituitary is a growth hormone that stimulates physical development. Another is *oxytocin*, which enables contractions associated with birthing, milk flow during nursing, and orgasm. Oxytocin also promotes pair bonding, group cohesion, and social trust (De Dreu et al., 2010; Zak, 2012). During a laboratory game, those given a nasal squirt of oxytocin rather than a placebo were more likely to trust strangers with their money and with confidential information (Kosfeld et al., 2005; Marsh et al., 2015; Mikolajczak et al., 2010).

pituitary gland

the endocrine system’s most influential gland. Under the influence of the hypothalamus, the pituitary regulates growth and controls other endocrine glands.

Pituitary secretions also direct other endocrine glands to release their hormones. The pituitary, then, is a master gland (whose own master is the hypothalamus). For example, under the brain’s influence, the pituitary triggers your sex glands to release sex hormones. These in turn influence your brain and behavior (Goetz et al., 2014). So, too, with stress. A stressful event triggers your hypothalamus to instruct your pituitary to release a hormone that causes your adrenal glands to flood your body with *cortisol*, a stress hormone that increases blood sugar.

This feedback system (brain → pituitary → other glands → hormones → body and brain) reveals the intimate connection of the nervous and endocrine systems. The nervous system directs endocrine secretions, which then affect the nervous system. Conducting and coordinating this whole electrochemical orchestra is that flexible maestro we call the brain.

Check Your Understanding

Ask Yourself

- Can you remember feeling an extended period of discomfort after some particularly stressful event? How long did those feelings last?

Test Yourself

- Why is the pituitary gland called the “master gland”?
- How are the nervous and endocrine systems alike, and how do they differ?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 10 REVIEW

10-1 What are the functions of the nervous system's main divisions, and what are the three main types of neurons?

- The *central nervous system (CNS)*—the brain and the spinal cord—is the *nervous system's* decision maker.
- The *peripheral nervous system (PNS),* which connects the CNS to the rest of the body by means of *nerves,* gathers information and transmits CNS decisions to the rest of the body.
- The two main PNS divisions are the *somatic nervous system* (which enables voluntary control of the skeletal muscles) and the *autonomic nervous system* (which controls involuntary muscles and glands by means of its *sympathetic* and *parasympathetic divisions).*
- Neurons cluster into working networks.
- There are three types of neurons:

(1) *Sensory neurons* carry incoming information from sense receptors to the brain and spinal cord.

(2) *Motor neurons* carry information from the brain and spinal cord out to the muscles and glands.

(3) *Interneurons* communicate within the brain and spinal cord and between sensory and motor neurons.

10-2 What is the nature and what are the functions of the endocrine system, and how does it interact with the nervous system?

- The *endocrine system* is a set of glands that secrete *hormones* into the bloodstream, where they travel through the body and affect other tissues, including the brain. The *adrenal glands,* for example, release the hormones that trigger the fight-or-flight response.

- The endocrine system’s master gland, the *pituitary*, influences hormone release by other glands. In an intricate feedback system, the brain’s *hypothalamus* influences the pituitary gland, which influences other glands, which release hormones, which in turn influence the brain.

Multiple-Choice Questions

1. If you accidentally touch a hot stove, which of the following is responsible for moving your hand away before you even realize what you have done?

a. Sensory neuron
b. Motor neuron
c. Interneuron
d. Receptor neuron
e. Cortisol

2. Hormones are _______________ released into the bloodstream.

a. neurons
b. myelin
c. action potentials
d. electrical messengers
e. chemical messengers

3. Which division of the autonomic nervous system calms a person down once a stressful event has passed?

a. Parasympathetic
b. Central
c. Somatic
d. Sympathetic
e. Endocrine

4. Which of the following endocrine glands may explain unusually tall height in a 12-year-old?

a. Pituitary
b. Adrenal

c. Pancreas
d. Parathyroid
e. Testes

5. Which of the following communicates with the pituitary, which in turn controls the endocrine system?

a. Parathyroid glands
b. Autonomic nervous system
c. Hypothalamus
d. Spinal cord
e. Pancreas

6. Which division of the nervous system enables a person to move the muscles necessary to walk down the street?

a. Central nervous system
b. Sympathetic
c. Parasympathetic
d. Somatic
e. Endocrine

7. Female sex hormones are released by the

a. parathyroid glands.
b. pituitary gland.
c. hypothalamus.
d. thalamus.
e. ovaries.

8. The role of interneurons is to

a. send messages from specific body parts to the brain.
b. transmit and process information within the brain and spinal cord.
c. act as connectors, supporting other neurons in the brain.
d. send messages from the brain to body parts.
e. influence the pituitary gland.

Practice FRQs

1. While walking barefoot, you step on a piece of glass. Before you have a chance to consciously process what has happened, you draw your foot away from the glass. Identify and explain the three types of neurons that deal with information regarding this painful stimulus.

Answer

1 point: Sensory neurons carry information from the point of the injury to the central nervous system. Page 92

1 point: Interneurons are neurons within the brain and spinal cord. Interneurons would help you interpret the pain and enable your spinal cord to send out marching orders. Page 92

1 point: Motor neurons carry the instruction from the central nervous system to activate the muscles in your leg and foot. Page 92

2. Home alone, you hear a noise in another room. Explain the reactions of each of the following to this situation:
   - Sensory neurons
   - Sympathetic nervous system
   - Adrenal glands

(3 points)

Module **11 Studying the Brain, Older Brain Structures, and the Limbic System**

LEARNING TARGETS

- 11-1 Describe several techniques for studying the brain's connections to behavior and mind.
- 11-2 Describe the components of the brainstem, and summarize the functions of the brainstem, thalamus, reticular formation, and cerebellum.
- 11-3 Describe the limbic system's structures and functions.

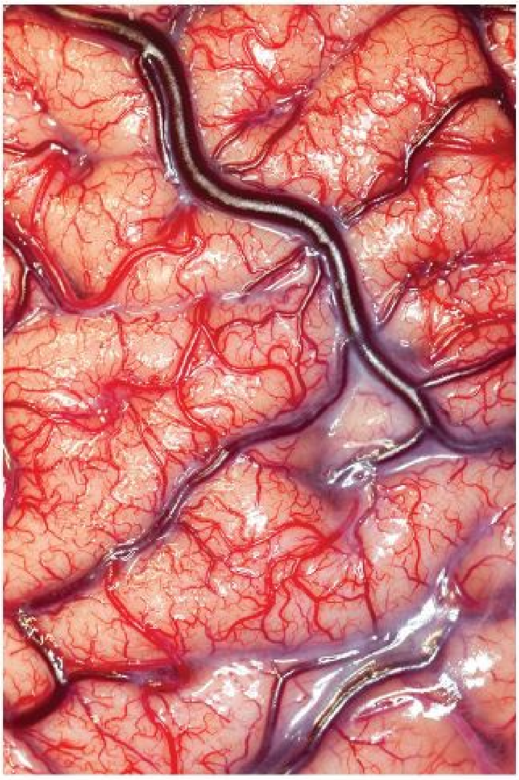
We are convinced that we live "somewhere north of the neck" (Fodor, 1999). And for good reason: The brain enables the mind—seeing, hearing, smelling, feeling, remembering, thinking, speaking, dreaming. An acquaintance of mine [DM's] received a new heart from a woman who, in a rare operation, had received a matched heart-lung transplant. When the two chanced to meet in their hospital ward, she introduced herself: "I think you have my heart." But only her heart. Her self, she assumed, still resided inside her skull. It is the brain that self-reflectively analyzes the brain. When you think *about* your brain, you're thinking *with* your brain—by releasing billions of neurotransmitter molecules across trillions of synapses. Yet the effect of hormones on experiences such as love reminds us that we would not be of the same mind if we were a bodiless brain. Brain, behavior, and cognition are an integrated whole. But precisely where and how are the mind’s functions tied to the brain? Let’s first see how scientists explore such questions.

The Tools of Discovery: Having Our Head Examined

11-1 How do neuroscientists study the brain’s connections to behavior and mind?

For most of human history, scientists had no tools high-powered yet gentle enough to reveal a living brain’s activity. Early case studies helped localize some brain functions. Damage to one side of the brain often caused numbness or paralysis on the body’s opposite side, suggesting that the body’s right side is wired to the brain’s left side, and vice versa. Damage to the back of the brain disrupted vision, and to the left-front part of the brain produced speech difficulties. Gradually, these early explorers were mapping the brain.

> “*I am a brain, Watson. The rest of me is a mere appendix.*”
>
> *Sherlock Holmes, in Arthur Conan Doyle’s “The Adventure of the Mazarin Stone,” 1921*



Robert Ludlow/UCL Institute of Neurology /Wellcome Images

A living human brain exposed Today’s neuroscience tools enable us to “look under the hood” and glimpse the brain at work, enabling the mind.

Now, within a lifetime, a new generation of neural mapmakers is charting the known universe’s most amazing organ. Scientists can also selectively **lesion** (destroy) tiny clusters of normal or defective brain cells, leaving the surrounding tissue unharmed. In the laboratory, such studies have revealed, for example, that damage to one area of the hypothalamus in a rat’s brain reduces eating to the point of starvation, whereas damage in another area produces overeating.

lesion [LEE-zhuhn]

tissue destruction. A brain lesion is a naturally or experimentally caused destruction of brain tissue.

Today’s neuroscientists can also *stimulate* various brain parts—electrically, chemically, or magnetically—and note the effect. Depending on the stimulated brain part, people may—to name a few examples—giggle, hear voices, turn their head, feel themselves falling, or have an out-of-body experience (Selimbeyoglu & Parvizi, 2010).

Scientists can even snoop on the messages of individual neurons. With tips small enough to detect the electrical pulse in a single neuron, modern microelectrodes can, for example, now detect exactly where the information goes in a cat’s brain when someone strokes its whisker. Researchers can also eavesdrop on the chatter of billions of neurons and can see color representations of the brain’s energy-consuming activity. Promising new tools include *optogenetics*, which uses light to control the activity of individual neurons (Boyden, 2014). By programming neurons to become receptive to light, researchers can examine the biological basis of fear, smell, memory, and various diseases (Drew et al., 2016; Gradinaru et al., 2009; Liu et al., 2012; Shusterman et al., 2011).

In addition to studying the brain by analyzing single cell activity—which is rather like watching a movie one pixel at a time—neuroscientists can also observe the whole brain in action. Right now, your mental activity is emitting telltale electrical, metabolic, and magnetic signals that would enable neuroscientists to observe your brain at work. Electrical activity in your brain's billions of neurons sweeps in regular waves across its surface. An **EEG (electroencephalogram)** is an amplified readout of such waves. Researchers record the brain waves through a shower-cap-like hat that is filled with electrodes covered with a conductive gel. Studying an EEG of the brain's activity is like studying a car engine by listening to its hum. With no direct access to the brain, researchers present a stimulus repeatedly and have a computer filter out brain activity unrelated to the stimulus. What remains is the electrical wave evoked by the stimulus.

EEG (electroencephalogram)
an amplified recording of the waves of electrical activity sweeping across the brain's surface. These waves are measured by electrodes placed on the scalp.

A related technique, **MEG (magnetoencephalography)**, measures magnetic fields from the brain's natural electrical activity. To isolate the brain's magnetic fields, researchers create special rooms that cancel out other magnetic signals, such as the Earth's magnetic field. Participants sit underneath a head coil that resembles a hair salon hairdryer. While participants complete activities, tens of thousands of neurons create electrical pulses, which in turn create magnetic fields. The speed and strength of the magnetic fields enable researchers to understand how certain tasks influence brain activity.

MEG (magnetoencephalography)
a brain imaging technique that measures magnetic fields from the brain's natural electrical activity.

"You must look into people, as well as at them," advised Lord

Chesterfield in a 1746 letter to his son. Newer neuroimaging techniques give us that Superman-like ability to see inside the living brain. For example, the **CT (computed tomography) scan** examines the brain by taking X-ray photographs that can reveal brain damage. The **PET (positron emission tomography) scan** (**Figure 11.1**) depicts brain activity by showing each brain area's consumption of its chemical fuel, the sugar glucose. Active neurons gobble glucose. Our brain, though only about 2 percent of our body weight, consumes 20 percent of our calorie intake. After a person receives temporarily radioactive glucose, the PET scan can track the gamma rays released by this "food for thought" as a task is performed. Rather like weather radar showing rain activity, PET-scan "hot spots" show the most active brain areas as the person does mathematical calculations, looks at images of faces, or daydreams.

CT (computed tomography) scan

a series of X-ray photographs taken from different angles and combined by computer into a composite representation of a slice of the brain's structure. (Also called CAT scan.)

PET (positron emission tomography) scan

a visual display of brain activity that detects where a radioactive form of glucose goes while the brain performs a given task.

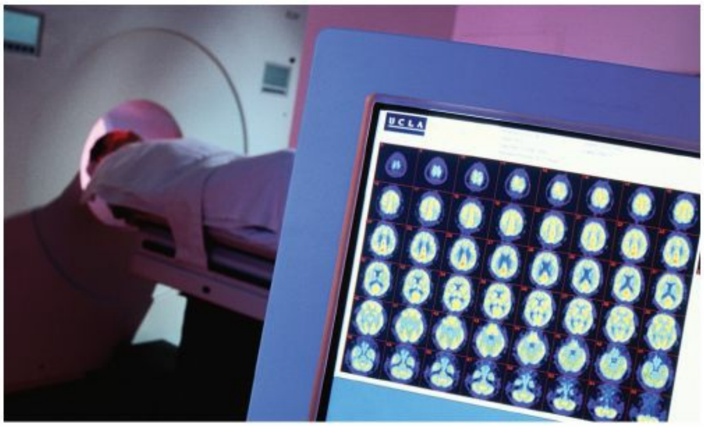


Figure 11.1
Mark Harmel/The Image Bank/Getty Images

Figure 11.1 The PET scan

To obtain a PET scan, researchers inject volunteers with a low and harmless dose of a short-lived radioactive sugar. Detectors around the person's head pick up the release of gamma rays from the sugar, which has concentrated in active brain areas. A computer then processes and translates these signals into a map of the brain at work.

In **MRI (magnetic resonance imaging)** brain scans, the person's head is put in a strong magnetic field, which aligns the spinning atoms of brain molecules. Then, a radio-wave pulse momentarily disorients the atoms. When the atoms return to their normal spin, they emit signals that provide a detailed picture of soft tissues, including the brain. MRI scans have revealed a larger-than-average neural area in the left hemisphere of musicians who display perfect pitch (Schlaug et al., 1995). They have also revealed enlarged *ventricles*—fluid-filled brain areas (marked by the red arrows in **Figure 11.2**)—in some patients who have schizophrenia, a disabling psychological disorder.

MRI (magnetic resonance imaging)
a technique that uses magnetic fields and radio waves to produce computer-generated images of soft tissue. MRI scans show brain anatomy.

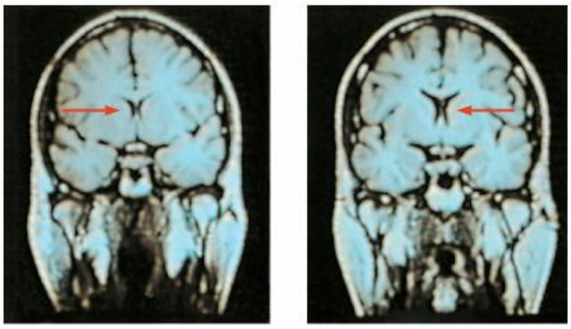


Figure 11.2
From Daniel Weinberger, M.D., CBDB, NIMH

Figure 11.2 MRI scan of a healthy individual (left) and a person with schizophrenia (right)

Note the enlarged ventricle, the fluid-filled brain region at the tip of the arrow in the image on the right.

A special application of MRI—**fMRI (functional MRI)**—can reveal the brain’s functioning as well as its structure. Where the brain is especially active, blood goes. By comparing successive MRI scans, researchers can watch as specific brain areas activate, showing increased oxygen-laden bloodflow. As a person looks at a scene, for example, the fMRI machine detects blood rushing to the back of the brain, which processes visual information. When the brain is unoccupied, blood continues to flow via a web of brain regions called the *default network* (Mason et al., 2007). Default network brain activity supports mind-wandering and daydreaming (Christoff et al., 2009; Smallwood & Schooler, 2015).

fMRI (functional MRI)

a technique for revealing bloodflow and, therefore, brain activity by comparing successive MRI scans. fMRI scans show brain function as well as structure.

Such snapshots of the brain’s changing activity provide new insights into how the brain divides its labor. A mountain of recent fMRI studies suggests which brain areas are most active when people feel pain or rejection, listen to angry voices, think about scary things, feel happy, or become sexually excited. The technology enables a very crude sort of mind reading. One neuroscience team scanned 129 people’s brains as they did eight different mental tasks (such as reading, gambling, or rhyming). Later, they were able, with 80 percent accuracy, to identify which of these mental activities their participants had been doing (Poldrack et al., 2009). Other research has used the brain’s activity to predict future behavior, such as school performance, drug use, and the effectiveness of public health campaigns (Falk et al., 2012, 2016; Gabrieli et al., 2015; **Table 11.1** compares these techniques).

TABLE 11.1 Types of Neural Measures

Name	**How Does It Work?**	**Example**
Electroencephalogram (EEG)	Electrodes placed on the scalp measure electrical activity in neurons.	Symptoms of depression and anxiety correlate with increased activity in the right frontal lobe, a brain area associated with behavioral withdrawal and negative emotion (Thibodeau et al., 2006).
Magnetoencephalography (MEG)	A head coil records magnetic fields from the brain’s natural electrical currents.	Soldiers with posttraumatic stress disorder (PTSD), compared with those who do not have PTSD, show stronger magnetic fields in the visual cortex when they view trauma-related images (Todd et al., 2015).
Computed tomography (CT)	X-rays of the head generate images that may locate brain damage.	Children’s brain injuries, shown in CT scans, predict impairments in their intelligence and memory processing (Königs et al., 2017).
Positron emission tomography (PET)	Tracks where a temporarily radioactive form of glucose goes while the brain of the person given it performs a given task.	Monkeys with an anxious temperament have brains that use more glucose in regions related to fear, memory, and expectations of reward and punishment (Fox et al., 2015).
Magnetic resonance imaging (MRI)	People sit or lie down in a chamber that uses magnetic fields and radio waves to provide a map of brain structure.	People with a history of violence tend to have smaller frontal lobes, especially in regions that aid moral judgment and self-control (Glenn & Raine, 2014).

Functional magnetic resonance imaging (fMRI)	Measures bloodflow to brain regions by comparing continuous MRI scans.	Years after surviving a near plane crash, passengers who viewed material related to their trauma showed greater activation in the brain's fear, memory, and visual centers than when they watched footage related to the 9/11 terrorist attacks (Palombo et al., 2015).

Researchers now seek to go beyond examining how brain regions work independently. To understand how different brain regions work together, they study brain connectivity, which can also offer clues to psychological disorders. For example, people with major depressive disorder tend to show low connectivity between brain regions involved in experiencing emotion and emotion regulation; these two types of brain regions don't "talk" very well (Kaiser et al., 2015). This poor neural communication may help explain why people with depression often struggle to regulate their emotions (Etkin et al., 2015; Miller et al., 2015).

You've seen the pictures—of colorful brains with accompanying headlines, such as "your brain on music." Hot brains make hot news (Bowers, 2016; Fine, 2010). In one study, students rated scientific explanations as more believable and interesting when they contained neuroscience (Fernandez-Duque et al., 2015). But "neuroskeptics" caution against overblown claims about any ability to predict customer preferences, detect lies, and foretell crime (Satel & Lilienfeld, 2013; Schwartz et al., 2016; Vul et al., 2009a,b). Neuromarketing, neurolaw, neuropolitics, and neurotheology are often neurohype. Imaging techniques illuminate brain structure and activity, and sometimes help us test different theories of behavior (Mather et al., 2013). But given that all human experience is brain-based, it's no surprise that different brain areas become active when one listens to a lecture or lusts for a lover.

* * *

Today's techniques for peering into the thinking, feeling brain are doing for psychology what the microscope did for biology and the telescope did for astronomy. From them we have learned more about the brain in the last 30 years than in the previous 30,000. And the next decade will reveal much more, as each year massive funding goes into brain research. Europe's Human Brain Project promises $1 billion for brain computer modeling. And the $40 million Human Connectome Project seeks "neural pathways [that] will reveal much about what makes us uniquely human and what makes every person different from all others" (2013; Gorman, 2014; Smith et al., 2015). It harnesses the power of *diffusion spectrum imaging*, a type of MRI technology that maps long-distance brain fiber connections (Jarbo & Verstynen, 2015) (**Figure 11.3**). Such efforts have led to the creation of a new brain map with 100 neural centers not previously described (Glasser et al., 2016).

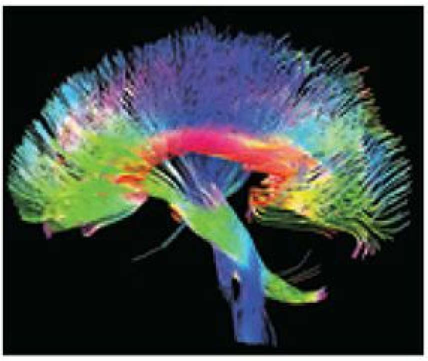


Figure 11.3
Tom Barrick, Chris Clark, SGHMS/Science Photo Library/Science Source

Figure 11.3 Beautiful brain connections

The Human Connectome Project is using cutting-edge methods to map the brain's interconnected network of neurons. These brain maps have helped identify over 100 new neural centers (Glasser et al., 2016).

To learn about the neurosciences now is like studying world geography when Magellan explored the seas. Today's whole-brain mapping effort has been likened to last century's Apollo program, which landed humans on the Moon. This truly is the golden age of brain science.

Check Your Understanding

Ask Yourself

- How do you feel about the possibility of predicting future behavior by studying brain activity? What might be the benefits and drawbacks of such research?

Test Yourself

- Match the scanning technique with the correct description.

Technique	**Description**
1. fMRI scan	a. tracks radioactive glucose to reveal brain *activity*.
2. PET scan	b. tracks successive images of brain tissue to show brain *function*.
3. MRI scan	c. uses magnetic fields and radio waves to show brain *anatomy*.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Older Brain Structures

11-2 What structures make up the brainstem, and what are the functions of the brainstem, thalamus, reticular formation, and cerebellum?

An animal’s capacities come from its brain structures. In primitive animals, such as sharks, a not-so-complex brain primarily regulates basic survival functions: breathing, resting, and feeding. In lower mammals, such as rodents, a more complex brain enables emotion and greater memory. In advanced mammals, such as humans, a brain that processes more information enables increased foresight as well.

AP® EXAM TIP

Your authors, David Myers and Nathan DeWall, are about to take you on a journey through your brain. Focus on the name of each part, its location within the brain, and what it does. Then it’s time to practice, practice, practice. The brain structures have been on previous AP® exams.

The brain’s increasing complexity arises from new systems built on top of the old, much as Earth’s landscape covers the old with the new. Digging down, one discovers the fossil remnants of the past—brainstem components performing for us much as they did for our distant ancestors. Let’s start with the brain’s base and work up to the newer systems.

The Brainstem

The **brainstem** is the brain’s oldest and innermost region. Its base is the **medulla**, the slight swelling in the spinal cord just after it enters the skull (**Figure 11.4**). Here lie the controls for your heartbeat and breathing. As some brain-damaged patients in a vegetative state illustrate, we need no higher brain or conscious mind to orchestrate our heart’s pumping and lungs' breathing. The brainstem handles those tasks. Just above the medulla sits the *pons*, which helps coordinate movements and control sleep.

brainstem

the oldest part and central core of the brain, beginning where the spinal cord swells as it enters the skull; the brainstem is responsible for automatic survival functions.

medulla [muh-DUL-uh]

the base of the brainstem; controls heartbeat and breathing.

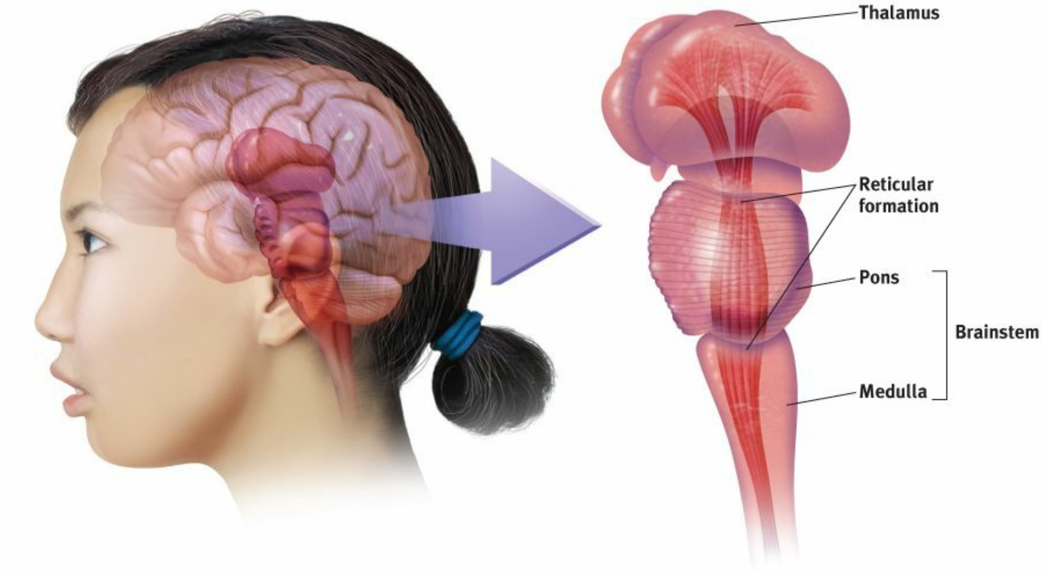


Figure 11.4
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Figure 11.4 The brainstem and thalamus

The brainstem, including the pons and medulla, is an extension of the spinal cord. The thalamus is attached to the top of the brainstem. The reticular formation passes through both structures.

If a cat's brainstem is severed from the rest of the brain above it, the animal will still breathe and live—and even run, climb, and groom (Klemm, 1990). But cut off from the brain's higher regions, it won't *purposefully* run or climb to get food.

The brainstem is a crossover point, where most nerves to and from each side of the brain connect with the body’s opposite side (**Figure 11.5**). This peculiar cross-wiring is but one of the brain’s many surprises.

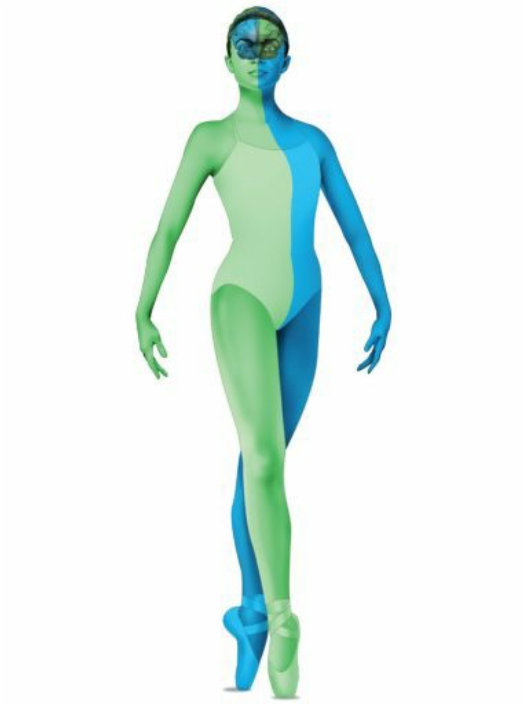

Figure 11.5
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Figure 11.5 The body’s wiring

Nerves from the left side of the brain are mostly linked to the right side of the body, and vice versa.

The Thalamus

Sitting atop the brainstem is the **thalamus**, a pair of egg-shaped structures that act as the brain’s sensory control center (Figure 11.5). The thalamus receives information from all the senses except smell, and routes that information to the higher brain regions that deal with seeing, hearing, tasting, and touching. The thalamus also receives some of the higher brain’s replies, which it then directs to the medulla and to the cerebellum (see below). For sensory information, your thalamus is something like London’s Heathrow Airport, a hub through which traffic flows in and out on its way to various locations.

thalamus [THAL-uh-muss]
the brain’s sensory control center, located on top of the brainstem; it directs messages to the sensory receiving areas in the cortex and transmits replies to the cerebellum and medulla.

The Reticular Formation

Inside the brainstem, between your ears, lies the **reticular** (“netlike”) **formation**, a neuron network extending from the spinal cord right up through the thalamus. As the spinal cord’s sensory input flows up to the thalamus, some of it travels through the reticular formation, which filters incoming stimuli and relays important information to other brain areas. Have you multitasked today? You can thank your reticular formation (Wimmer et al., 2015).

reticular formation
a nerve network that travels through the brainstem into the thalamus and plays an important role in controlling arousal.

The reticular formation also controls arousal, as Giuseppe Moruzzi and Horace Magoun discovered in 1949. Electrically stimulating a sleeping cat’s reticular formation almost instantly produced an awake, alert animal. When Magoun *severed* a cat’s reticular formation without damaging nearby sensory pathways, the effect was equally dramatic: The cat lapsed into a coma from which it never awakened.

The Cerebellum

Extending from the rear of the brainstem is the baseball-sized **cerebellum**, meaning “little brain,” which is what its two wrinkled halves resemble (**Figure 11.6**). As you will see in Module 32, the cerebellum enables nonverbal learning and skill memory. It also helps us judge time, modulate our emotions, and discriminate sounds and textures (Bower & Parsons, 2003). And (with assistance from the pons) it coordinates voluntary movement. When a soccer player masterfully controls the ball, give the player’s cerebellum some credit. Under alcohol’s influence on the cerebellum, coordination suffers. And if you injured your cerebellum, you would have difficulty walking, keeping your balance, or shaking hands. Your movements would be jerky and exaggerated. Gone would be any dreams of being a dancer or guitarist.

cerebellum [sehr-uh-BELL-um]

the “little brain” at the rear of the brainstem; functions include processing sensory input, coordinating movement output and balance, and enabling nonverbal learning and memory.

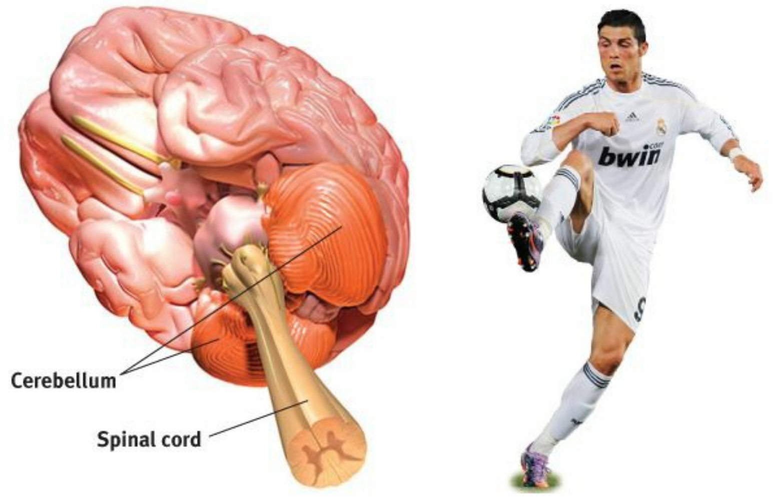

Figure 11.6
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Sergio Torres/AP Images

Figure 11.6 **The brain’s organ of agility**

Hanging at the back of the brain, the cerebellum coordinates our voluntary movements, as when soccer star Cristiano Ronaldo controls the ball.

* * *

Note: These older brain functions all occur without any conscious effort. This illustrates another of our recurring themes: *Our brain processes most* *information outside of our awareness.* We are aware of the *results* of our brain's labor—say, our current visual experience—but not *how* we construct the visual image. Likewise, whether we are asleep or awake, our brainstem manages its life-sustaining functions, freeing our newer brain regions to think, talk, dream, or savor a memory.

✓ Check Your Understanding

Ask Yourself

- Are you surprised to learn about all the information-processing that happens automatically, without your knowledge? Why or why not?

Test Yourself

- The _______________ is a crossover point where nerves from the left side of the brain are mostly linked to the right side of the body, and vice versa.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

The Limbic System

11-3 What are the limbic system’s structures and functions?

We’ve considered the brain’s oldest parts, but we’ve not yet reached its newest and highest regions, the *cerebral hemispheres* (the two halves of the brain). Between the oldest and newest brain areas lies the **limbic system** (*limbus* means “border”). This system contains the *amygdala*, the *hypothalamus*, and the *hippocampus* (**Figure 11.7**).

limbic system

neural system (including the *amygdala*, *hypothalamus*, and *hippocampus*) located below the cerebral hemispheres; associated with emotions and drives.

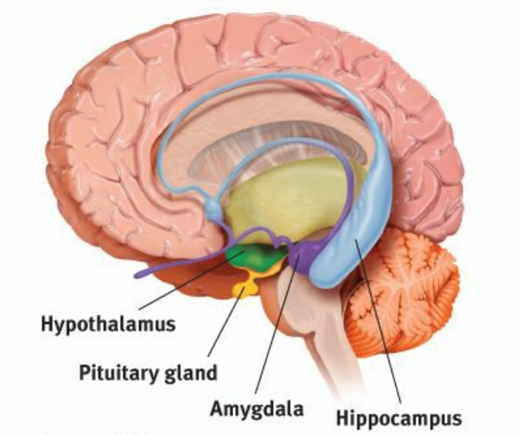

Figure 11.7
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Figure 11.7 **The limbic system**

This neural system sits between the brain’s older parts and its cerebral hemispheres. The limbic system’s hypothalamus controls the nearby pituitary gland.

Flip It Video: Limbic System

The Amygdala

Research has linked the **amygdala**, two lima-bean-sized neural clusters, to aggression and fear. In 1939, psychologist Heinrich Klüver and neurosurgeon Paul Bucy surgically removed a rhesus monkey's amygdala, turning the normally ill-tempered animal into the most mellow of creatures. In studies with other wild animals, including the lynx, wolverine, and wild rat, researchers noted the same effect. So, too, with human patients. Those with amygdala lesions often display reduced arousal to fear- and anger-arousing stimuli (Berntson et al., 2011). One such woman, patient S. M., has been called "the woman with no fear," even if being threatened with a gun (Feinstein et al., 2013).

amygdala [uh-MIG-duh-la]

two lima-bean-sized neural clusters in the limbic system; linked to emotion.

What then might happen if we electrically stimulated the amygdala of a normally placid domestic animal, such as a cat? Do so in one spot and the cat prepares to attack, hissing with its back arched, its pupils dilated, its hair on end. Move the electrode only slightly within the amygdala, cage the cat with a small mouse, and now it cowers in terror.

GK Hart/Vikki Hart/Getty Images

Aggression as a brain state Back arched and fur fluffed, this fierce cat is ready to attack. Electrical stimulation of a cat's amygdala provokes angry reactions, suggesting the amygdala's role in aggression. Which ANS division is activated by such stimulation?[1]

These and other experiments have confirmed the amygdala's role in emotions such as fear and rage. One study found math anxiety associated with hyperactivity in the right amygdala (Young et al., 2012). Monkeys and humans with amygdala damage become less fearful of strangers (Harrison et al., 2015). Other studies link criminal behavior with amygdala dysfunction (Boccardi et al., 2011; Ermer et al., 2012). When people view angry and happy faces, only the angry ones increase activity in the amygdala (Mende-Siedlecki et al., 2013). But we must be careful. The brain is not neatly organized into structures that correspond to our behavior categories. When we feel afraid or act aggressively, there is neural activity in many areas of our brain—not just the amygdala. If you destroy a car's battery, it's true that you won't be able to start the engine. But the battery is merely one link in an integrated system.

The Hypothalamus

Just below *(hypo)* the thalamus is the **hypothalamus** (**Figure 11.8**), an important link in the command chain governing bodily maintenance. Some neural clusters in the hypothalamus influence hunger; others regulate thirst, body temperature, and sexual behavior. Together, they help maintain a steady *(homeostatic)* internal state.

hypothalamus [hi-po-THAL-uh-muss]
a neural structure lying below *(hypo)* the thalamus; it directs several maintenance activities (eating, drinking, body temperature), helps govern the endocrine system via the pituitary gland, and is linked to emotion and reward.

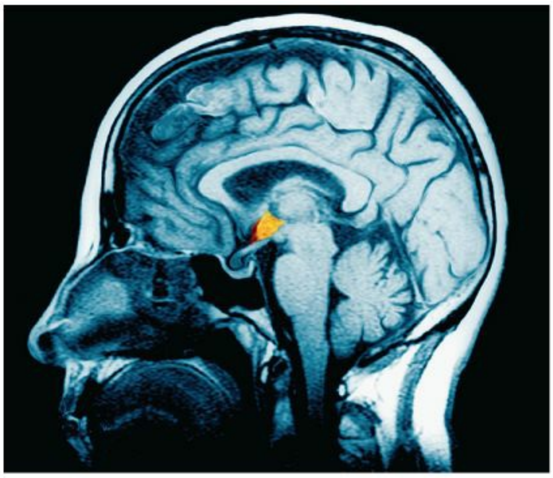

Figure 11.8
ISM/Medical Images USA

Figure 11.8 The hypothalamus

This small but important structure, colored yellow/orange in this MRI scan, helps keep the body’s internal environment in a steady state.

To monitor your body state, the hypothalamus tunes into your blood chemistry and any incoming orders from other brain parts. For example, picking up signals from your brain’s cerebral cortex that you are thinking about sex, your hypothalamus will secrete hormones. These hormones will in turn trigger the adjacent “master gland” of the endocrine system, your pituitary (see Figure 11.7), to influence your sex glands to release *their* hormones. These hormones will intensify the thoughts of sex in your cerebral cortex. (Once again, we see the interplay between the nervous and endocrine systems: The brain influences the endocrine system, which in turn influences the brain.)

A remarkable discovery about the hypothalamus illustrates how progress in science often occurs—when curious, open-minded investigators make an unexpected observation. Two young McGill University neuropsychologists, James Olds and Peter Milner (1954), were trying to implant an electrode in a rat’s reticular formation when they made a magnificent mistake: They placed the electrode incorrectly (Olds, 1975). Curiously, as if seeking more stimulation, the rat kept returning to the location where it had been stimulated by this misplaced electrode. On discovering that they had actually placed the device in a region of the hypothalamus, Olds and Milner realized they had stumbled upon a brain center that provides pleasurable rewards (Olds, 1975).

Later experiments located other “pleasure centers” (Olds, 1958). (What the rats actually experience only they know, and they aren’t telling. Rather than attribute human feelings to rats, today’s scientists refer to *reward centers*, not “pleasure centers.”) Just how rewarding are these reward centers? Enough to cause rats to self-stimulate these brain regions more than 1000 times per hour. Moreover, they would even cross an electrified floor that a starving rat would not cross to reach food (**Figure 11.9**).

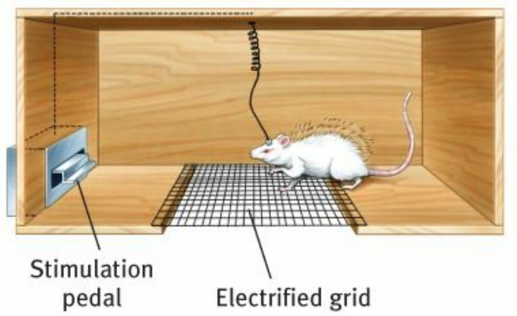

Figure 11.9
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Figure 11.9 Rat with an implanted electrode

With an electrode implanted in a reward center of its hypothalamus, the rat readily crosses an electrified grid, accepting the painful shocks, to press a pedal that sends electrical impulses to that center.

In other species, including dolphins and monkeys, researchers later discovered other limbic system reward centers, such as the *nucleus accumbens* in front of the hypothalamus (Hamid et al., 2016). Animal research has also revealed both a general dopamine-related reward system and specific centers associated with the pleasures of eating, drinking, and sex. Animals, it seems, come equipped with built-in systems that reward activities essential to survival.

Researchers are experimenting with new ways of using brain stimulation to control nonhuman animals’ actions in search-and-rescue operations. By rewarding rats for turning left or right, one research team trained previously caged rats to navigate natural environments (Talwar et al., 2002; **Figure 11.10**). By pressing buttons on a laptop, the researchers were then able to direct the rat—which carried a receiver, power source, and video camera all in a tiny backpack—to turn on cue, climb trees, scurry along branches, and return.

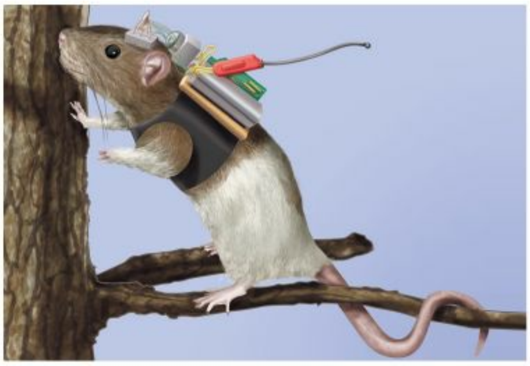

Figure 11.10
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Figure 11.10 Ratbot on a pleasure cruise

When stimulated by remote control, a rat could be guided to navigate across a field and even up a tree.

Do humans have limbic centers for pleasure? To calm violent patients, one neurosurgeon implanted electrodes in such areas. Stimulated patients reported mild pleasure; unlike Olds' rats, however, they were not driven to a frenzy (Deutsch, 1972; Hooper & Teresi, 1986). Moreover, newer research reveals that stimulating the brain's "hedonic hotspots" (its reward circuits) produces more *desire* than pure enjoyment (Kringelbach & Berridge, 2012). Experiments have also revealed the effects of a dopamine-related reward system in people. For example, dopamine release produces our pleasurable "chills" response to a favorite piece of music (Zatorre & Salimpoor, 2013).

> “*If you were designing a robot vehicle to walk into the future and survive, . . . you'd wire it up so that behavior that ensured the survival of the self or the species—like sex and eating—would be naturally reinforcing.*”

Candace Pert (1986)

Some researchers believe that substance use disorders may stem from malfunctions in natural brain systems for pleasure and well-being. People genetically predisposed to this *reward deficiency syndrome* may crave whatever provides that missing pleasure or relieves negative feelings (Blum et al., 1996).

The Hippocampus

The **hippocampus**—a seahorse-shaped brain structure—processes conscious, explicit memories and decreases in size and function as we grow older. Humans who lose their hippocampus to surgery or injury also lose their ability to form new memories of facts and events (Clark & Maguire, 2016). Those who survive a hippocampal brain tumor in childhood struggle to remember new information in adulthood (Jayakar et al., 2015). National Football League players who experience one or more loss-of-consciousness concussions may later have a shrunken hippocampus and poor memory (Strain et al., 2015). Module 54 offers additional detail about how hippocampus size and function decrease as we grow older. Module 32 explains how our two-track mind uses the hippocampus to process our memories.

hippocampus

a neural center located in the limbic system; helps process for storage explicit (conscious) memories of facts and events.

* * *

Figure 11.11 locates the brain areas we’ve discussed, as well as the *cerebral cortex*, our next topic.

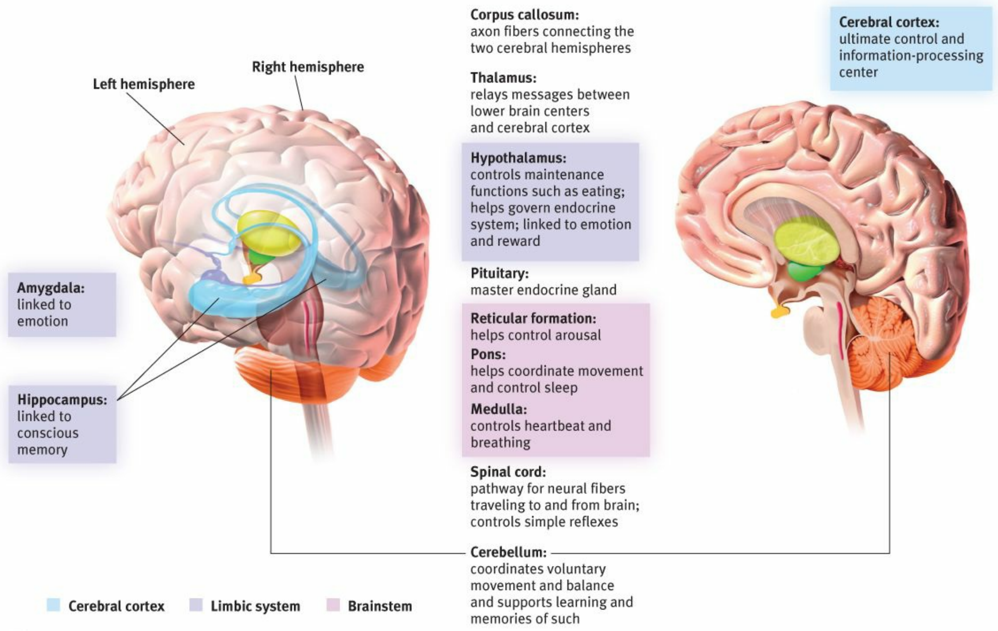
Left hemisphere
Right hemisphere
Amygdala: linked to emotion
Hippocampus: linked to conscious memory
Corpus callosum: axon fibers connecting the two cerebral hemispheres
Thalamus: relays messages between lower brain centers and cerebral cortex
Hypothalamus: controls maintenance functions such as eating; helps govern endocrine system; linked to emotion and reward
Pituitary: master endocrine gland
Reticular formation: helps control arousal
Pons: helps coordinate movement and control sleep
Medulla: controls heartbeat and breathing
Spinal cord: pathway for neural fibers traveling to and from brain; controls simple reflexes
Cerebellum: coordinates voluntary movement and balance and supports learning and memories of such
Cerebral cortex: ultimate control and information-processing center
Cerebral cortex
Limbic system
Brainstem

Figure 11.11
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Figure 11.11 Brain structures and their functions

Check Your Understanding

Ask Yourself

- If one day researchers discover how to stimulate human limbic centers to produce as strong a reaction as found in other animals, do you think this process could be used to reduce the incidence of substance use? Could such use have any negative consequences?

Test Yourself

- What are the three key structures of the limbic system, and what functions do they serve?
- Electrical stimulation of a cat's amygdala provokes angry reactions. Which *autonomic nervous system* division is activated by such stimulation?
- In what brain region would damage be most likely to (1) disrupt your ability to jump rope? (2) disrupt your ability to hear? (3) leave you in a coma? (4) cut off the very breath and heartbeat of life?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 11 REVIEW

11-1 How do neuroscientists study the brain’s connections to behavior and mind?

- Case studies and *lesioning* first revealed the general effects of brain damage.
- Modern electrical, chemical, or magnetic stimulation has also revealed aspects of information processing in the brain.
- *CT* and *MRI* scans show anatomy. *EEG, MEG, PET*, and *fMRI (functional MRI)* recordings reveal brain function.

11-2 What structures make up the brainstem, and what are the functions of the brainstem, thalamus, reticular formation, and cerebellum?

- The *brainstem*, the oldest part of the brain, is responsible for automatic survival functions. Its components are the *medulla* (which controls heartbeat and breathing), the pons (which helps coordinate movements), and the *reticular formation* (which filters incoming stimuli, relays information to other brain areas, and affects arousal).
- The *thalamus*, sitting above the brainstem, acts as the brain’s sensory control center. The *cerebellum*, attached to the rear of the brainstem, coordinates muscle movement and balance and also helps process sensory information.

11-3 What are the limbic system’s structures and functions?

- The *limbic system* is linked to emotions, memory, and drives.
- Its neural centers include the *amygdala* (involved in responses of aggression and fear); the *hypothalamus* (involved in various bodily maintenance functions, pleasurable rewards, and the control of the

endocrine system); and the *hippocampus* (which processes conscious memories).

- The hypothalamus controls the pituitary (the “master gland”) by stimulating it to trigger the release of hormones.

Multiple-Choice Questions

1. Damage to which of the following puts a person’s life in the most danger because it may cause breathing to stop?

a. Amygdala
b. Thalamus
c. Medulla
d. Hippocampus
e. Hypothalamus

2. A gymnast falls and hits her head on the floor. She attempts to continue practicing but has trouble maintaining balance. What part of her brain has probably been affected?

a. Reticular formation
b. Cerebellum
c. Amygdala
d. Thalamus
e. Medulla

3. Which of the following scanning techniques measures glucose consumption as an indicator of brain activity?

a. CT
b. MRI
c. fMRI
d. PET
e. EEG

4. Which of the following is sometimes referred to as the brain’s sensory switchboard, because it directs incoming sensory messages (with the exception of smell) to their proper places in the brain?

a. Hypothalamus
b. Pituitary
c. Cerebellum
d. Limbic system
e. Thalamus

5. Which of the following brain areas is responsible for regulating hunger and thirst?

a. Reticular activating system
b. Amygdala
c. Hypothalamus
d. Hippocampus
e. Brainstem

6. Stimulation of the amygdala is most likely to have which of the following effects?

a. Happiness
b. Aggression
c. Hunger
d. Loss of balance
e. Dreaming

7. Damage to which of following brain structures would affect the processing of new explicit memories?

a. Cerebral cortex
b. Medulla
c. Corpus callosum
d. Hippocampus
e. Hypothalamus

Practice FRQs

1. Thomas fell and hit his head, so his parents brought him to the emergency room. Explain how the following scans would give doctors different information about the type of injury Thomas may have.

- CT scan
- MRI
- fMRI

Answer

1 point: The CT scan would reveal brain damage to structures that would be visible on an X-ray. Page 99

1 point: The MRI would provide a much more detailed picture of the brain than a CT scan. Page 99

1 point: The fMRI would enable the doctors to determine if the functioning of parts of the brain had been damaged, by looking at blood flow to certain regions. Page 100

2. Identify the role of each of the following in playing a song on the piano.

- Hippocampus
- Cerebellum
- Reticular formation
- Temporal lobe

(4 points)

Module 12 The Cerebral Cortex

LEARNING TARGETS

- 12-1 Describe the four lobes that make up the cerebral cortex and explain the functions of the motor cortex, somatosensory cortex, and association areas.
- 12-2 Analyze the notion that we really use only 10 percent of our brain.
- 12-3 Discuss how the brain adjusts to new experiences.
- 12-4 Discuss the brain's ability to reorganize itself after damage, and explain neurogenesis.

Older brain networks sustain basic life functions and enable memory, emotions, and basic drives. Newer neural networks within the *cerebrum*—the two cerebral hemispheres contributing 85 percent of the brain's weight—form specialized work teams that enable our perceiving, thinking, and speaking. Like other structures above the brainstem (including the thalamus, hippocampus, and amygdala), the cerebral hemispheres come as a pair. Covering those hemispheres, like bark on a tree, is the **cerebral cortex**, a thin surface layer of interconnected neural cells. In our brain's evolutionary history, the cerebral cortex is a relative newcomer. It is your brain's thinking crown, your body's ultimate control and information-processing center.

cerebral [seh-REE-bruhl] cortex

the intricate fabric of interconnected neural cells covering the cerebral hemispheres; the body's ultimate control and information-processing center.

As we move up the ladder of animal life, the cerebral cortex expands, tight genetic controls relax, and the organism's adaptability increases. Frogs and other small-cortex amphibians operate extensively on preprogrammed genetic instructions. The larger cortex of mammals offers increased capacities for learning and thinking, enabling them to be more adaptable. What makes us distinctively human mostly arises from the complex functions of our cerebral cortex.

✓ Check Your Understanding

Ask Yourself

- Does learning about our brain's evolutionary history make you feel more connected to, or more separate from, other mammals and our distant ancestors?

Test Yourself

- Which area of the human brain is most similar to that of less complex animals? Which part of the human brain distinguishes us most from less complex animals?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Structure of the Cortex

12-1 What four lobes make up the cerebral cortex, and what are the functions of the motor cortex, somatosensory cortex, and association areas?

If you opened a human skull, exposing the brain, you would see a wrinkled organ, shaped somewhat like the meat of an oversized walnut. Without these wrinkles, a flattened cerebral cortex would require triple the area—roughly that of a large pizza. The brain's left and right hemispheres are filled mainly with axons connecting the cortex to the brain's other regions. The cerebral cortex—that thin surface layer—contains some 20 to 23 billion of the brain's nerve cells and 300 trillion synaptic connections (de Courten-Myers, 2005). Being human takes a lot of nerve.

Each hemisphere's cortex is subdivided into four *lobes*, separated by prominent *fissures*, or folds. Starting at the front of your brain and moving over the top, there are the **frontal lobes** (behind your forehead), the **parietal lobes** (at the top and to the rear), and the **occipital lobes** (at the back of your head). Reversing direction and moving forward, just above your ears, you find the **temporal lobes**. Each of the four lobes carries out many functions, and many functions require the interplay of several lobes (**Figure 12.1**).

frontal lobes

the portion of the cerebral cortex lying just behind the forehead; involved in speaking and muscle movements and in making plans and judgments.

parietal [puh-RYE-uh-tuhl] lobes

the portion of the cerebral cortex lying at the top of the head and toward the rear; receives sensory input for touch and body position.

occipital [ahk-SIP-uh-tuhl] lobes

the portion of the cerebral cortex lying at the back of the head; includes areas that receive information from the visual fields.

temporal lobes

the portion of the cerebral cortex lying roughly above the ears; includes the auditory areas, each receiving information primarily from the opposite ear.

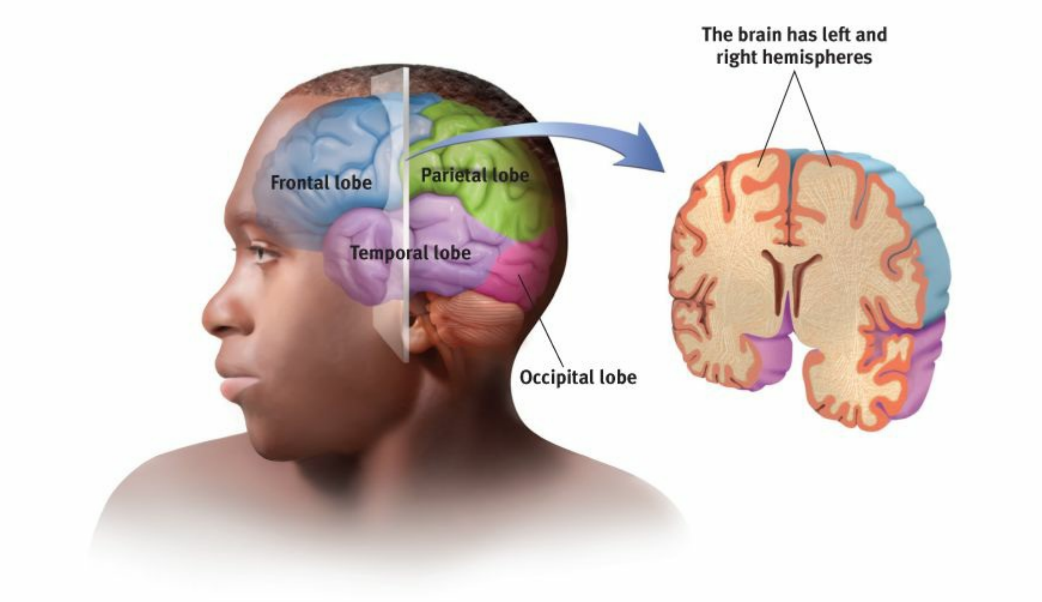

The brain has left and right hemispheres
Frontal lobe
Parietal lobe
Temporal lobe
Occipital lobe

Figure 12.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 12.1 The cortex and its basic subdivisions

Flip It Video: Structure and Function of the Cortex

FYI

The people who first dissected and labeled the brain used the language of scholars—Latin and Greek. The words they chose are actually graphic descriptions: For example, *cortex* means "bark," cerebellum is "little brain," and *thalamus* is "inner chamber."

Functions of the Cortex

More than a century ago, surgeons found damaged cortical areas during autopsies of people who had been partially paralyzed or speechless. This rather crude evidence did not prove that specific parts of the cortex control complex functions like movement or speech. A laptop with a broken power cord might go dead, but we would be fooling ourselves if we thought we had "localized" the Internet in the cord.

Motor Functions

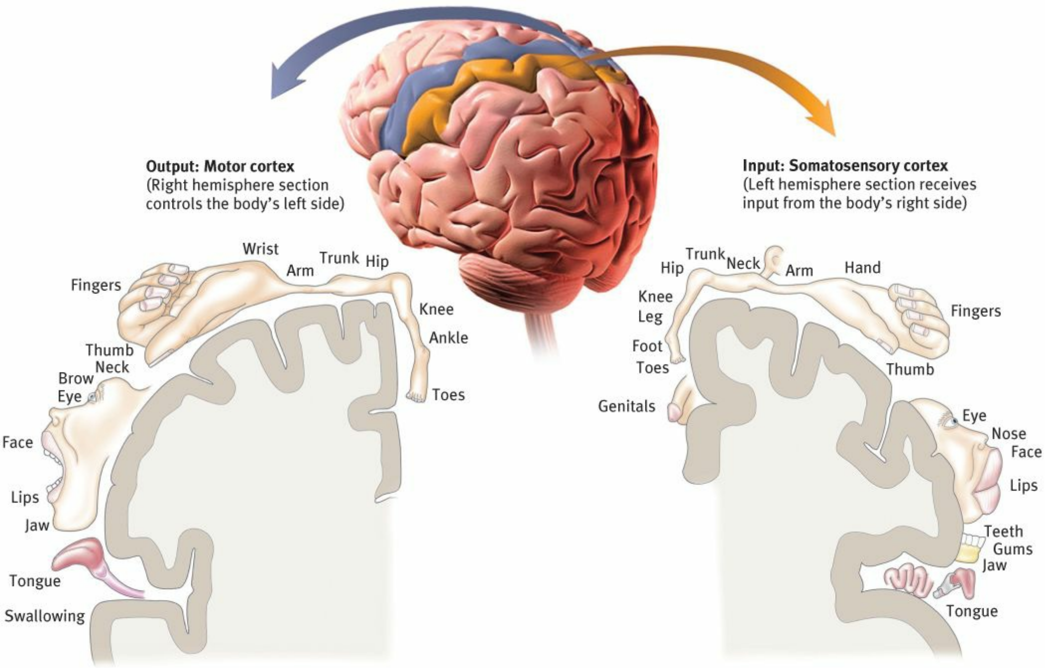
Scientists had better luck in localizing simpler brain functions. For example, in 1870, German physicians Gustav Fritsch and Eduard Hitzig made an important discovery: Mild electrical stimulation to parts of an animal's cortex made parts of its body move. The effects were selective: Stimulation caused movement only when applied to an arch-shaped region at the back of the frontal lobe, running roughly ear-to-ear across the top of the brain. Moreover, stimulating parts of this region in the left or right hemisphere caused movements of specific body parts on the *opposite* side of the body. Fritsch and Hitzig had discovered what is now called the **motor cortex**.

motor cortex

an area at the rear of the frontal lobes that controls voluntary movements.

Mapping the Motor Cortex

Lucky for brain surgeons and their patients, the brain has no sensory receptors. Knowing this, in the 1930s, Otfrid Foerster and Wilder Penfield were able to map the motor cortex in hundreds of wide-awake patients by stimulating different cortical areas and observing responses. They discovered that body areas requiring precise control, such as the fingers and mouth, occupy the greatest amount of cortical space (**Figure 12.2**). In one of his many demonstrations of motor behavior mechanics, Spanish neuroscientist José Delgado stimulated a spot on a patient's left motor cortex, triggering the right hand to make a fist. Asked to keep the fingers open during the next stimulation, the patient, whose fingers closed despite his best efforts, remarked, "I guess, Doctor, that your electricity is stronger than my will" (Delgado, 1969, p. 114).



Output: Motor cortex
(Right hemisphere section controls the body's left side)
Input: Somatosensory cortex
(Left hemisphere section receives input from the body's right side)
Wrist
Arm
Trunk
Hip
Fingers
Knee
Ankle
Thumb
Neck
Brow
Eye
Toes
Face
Lips
Jaw
Tongue
Swallowing
Trunk
Hip
Neck
Arm
Hand
Knee
Leg
Fingers
Foot
Toes
Thumb
Genitals
Eye
Nose
Face
Lips
Teeth
Gums
Jaw
Tongue

Figure 12.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
BSIP/Science Source

Figure 12.2 Motor cortex and somatosensory cortex tissue devoted to each body part

As you can see from this classic though inexact representation, the amount of cortex devoted to a body part in the motor cortex (in the frontal lobes) or in the somatosensory cortex (in the parietal lobes) is not proportional to that body part's size. Rather, the brain devotes more tissue to sensitive areas and to areas requiring precise control. Thus, the fingers have a greater representation in the cortex than does the upper arm.

More recently, scientists were able to predict a monkey's arm motion a tenth of a second *before* it moved—by repeatedly measuring motor cortex activity preceding specific arm movements (Gibbs, 1996). Such findings have opened the door to research on brain-controlled computer technology.

Brain-Computer Interfaces

By eavesdropping on the brain, could we enable a paralyzed person to move a robotic limb? Could a brain-computer interface command a cursor to write an email or do an online search? To find out, brain researchers implanted 100 tiny recording electrodes in the motor cortexes of three monkeys (Nicolelis, 2011; Serruya et al., 2002). As the monkeys gained rewards by using a joystick to follow a moving red target, the researchers matched the brain signals with the arm movements. Then they programmed a computer to monitor the signals and operate the joystick. When a monkey merely thought about a move, the mind-reading computer moved the cursor with nearly the same proficiency as had the reward-seeking monkey. In follow-up experiments, both monkeys and humans have learned to control a robot arm or wheelchair that could help them receive food (Collinger et al., 2013; Hochberg et al., 2012; Rajangam et al., 2016; Velliste et al., 2008; see **Figure 12.3**).

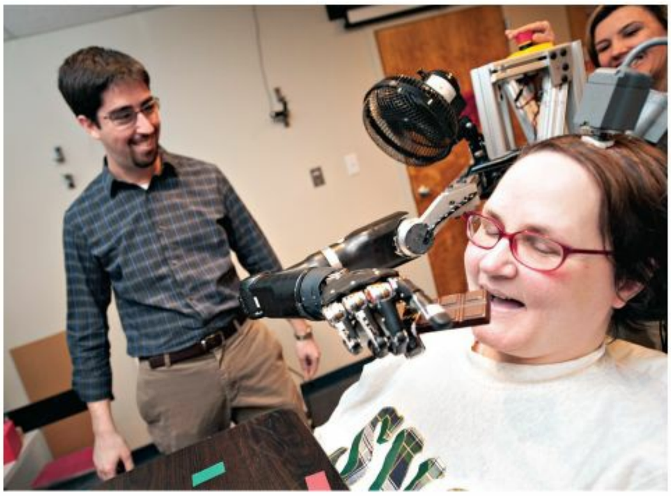


Figure 12.3
UPMC

Figure 12.3 Mind over matter

A neurodegenerative disease caused Jan’s complete paralysis. Yet, thanks to a tiny, 96-electrode implant in her motor cortex, she and others have learned to direct a robotic arm with their thoughts (Collinger et al., 2013; Hochberg et al., 2012).

Research has also recorded messages not from the arm-controlling motor neurons but from a brain area involved in planning and intention (Leuthardt et al., 2009; Musallam et al., 2004). In one study, a monkey seeking a juice reward awaited a cue telling it to reach toward a spot flashed on a screen in one of up to eight locations. A computer program captured the monkey's thinking by recording the associated activity. By matching this neural activity to the monkey's subsequent pointing, the mind-reading researchers could program a cursor to move in response to the monkey's thoughts. Monkey think, computer do.

If this technique works, why not use it to capture the words a person can think but cannot say (for example, after a stroke)? Cal Tech neuroscientist Richard Andersen (2005) and colleagues (2004) have speculated that researchers could implant electrodes in speech areas, then "ask a patient to think of different words and observe how the cells fire in different ways. So you build up your database, and then when the patient thinks of the word, you compare the signals with your database, and you can predict the words they're thinking. Then you take this output and connect it to a speech synthesizer. This would be identical to what we're doing for motor control." With this goal in mind, the U.S. Army has invested millions of dollars in neuroscientists' efforts to build a helmet that might read and transmit soldiers' thoughts (Piore, 2011).

FYI

In another demonstration of machine learning, researchers scanned the brains of physics students when they thought about 30 physics-relevant concepts, such as gravity and momentum (Mason & Just, 2016). A computer program learned to accurately identify the links between specific brain region activations and the concepts.

Clinical trials of such *cognitive neural prosthetics* are now under way with people who have severe paralysis or have lost a limb (Andersen et al., 2010; Nurmikko et al., 2010). The first patient, a 25-year-old man with paralysis, was able to mentally control a TV, draw shapes on a computer screen, and play video games—all thanks to an aspirin-sized chip with 100 microelectrodes recording activity in his motor cortex (Hochberg et al., 2006). Since then, others with paralysis who have received implants have learned to direct robotic arms with their thoughts (Collinger et al., 2013; Hochberg et al., 2012). And then there is Ian Burkhart, who lost the use of his arms and legs several years ago at the age of 19. Ohio State University brain researchers implanted recording electrodes in his motor cortex (Bouton et al., 2016). Using a technique called *machine learning*, they instructed Ian to stare at a computer screen that showed a moving hand. Next, Ian imagined moving his own hand. Brain signals from his motor cortex began feeding into the computer, which got the message that Ian wanted to move his arm and thus stimulate those muscles. The result? Ian, with his very own paralyzed arm, grasped a bottle, dumped out its contents, and picked up a stick. “The things I do in the lab,” Ian said, “I would love to [do] in everyday life” (Marcus, 2016). If everything psychological is also biological—if, for example, every thought is also a neural event—microelectrodes could someday detect complex thoughts well enough to enable people to control their environment with ever-greater precision (see **Figure 12.4**).

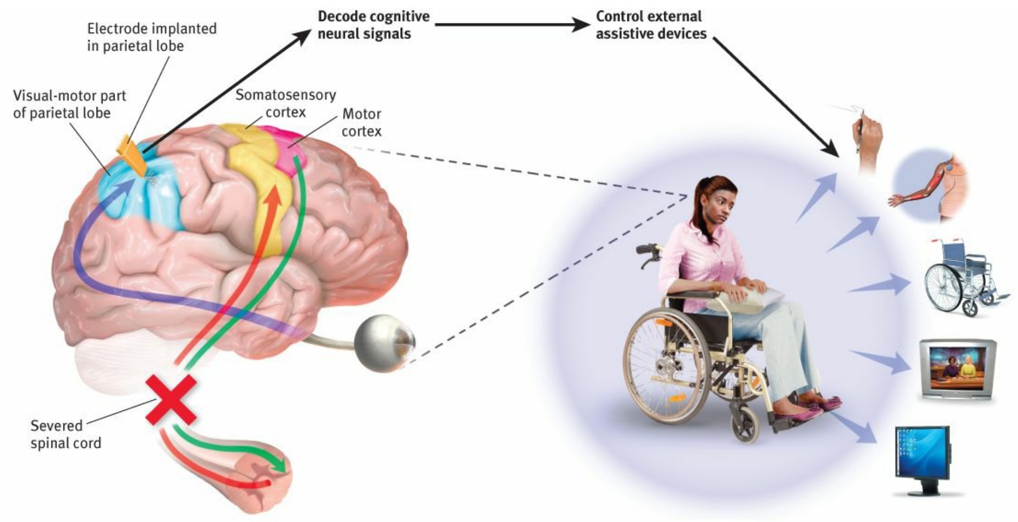

Electrode implanted in parietal lobe
Decode cognitive neural signals
Control external assistive devices
Visual-motor part of parietal lobe
Somatosensory cortex
Motor cortex
Severed spinal cord

Figure 12.4
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 12.4 Brain-computer interaction

Researchers planted electrodes in a parietal lobe region involved with planning to reach out an arm. This enabled the person’s thoughts to move a robotic limb, stimulate muscles that activate a paralyzed limb, navigate a wheelchair, control a TV, and use the Internet (Andersen et al., 2010).

Sensory Functions

If the motor cortex sends messages out to the body, where does the cortex receive incoming messages? Wilder Penfield identified a cortical area—at the front of the parietal lobes, parallel to and just behind the motor cortex—that specializes in receiving information from the skin senses, such as touch and temperature, and from the movement of body parts. We now call this area the **somatosensory cortex** (Figure 12.2). Stimulate a point on the top of this band of tissue and a person may report being touched on the shoulder; stimulate some point on the side and the person may feel something on the face.

somatosensory cortex

an area at the front of the parietal lobes that registers and processes body touch and movement sensations.

The more sensitive the body region, the larger the somatosensory cortex area devoted to it (Figure 12.2). Your supersensitive lips project to a larger brain area than do your toes, which is one reason we kiss rather than touch toes. Rats have a large area of the brain devoted to their whisker sensations, and owls to their hearing sensations.

Scientists have identified additional areas where the cortex receives input from senses other than touch. Any visual information you are receiving now is going to the visual cortex in your occipital lobes, at the back of your brain (**Figures 12.5** and **12.6**). If you have normal vision, you might see flashes of light or dashes of color if stimulated in your occipital lobes. (In a sense, we *do* have eyes in the back of our head!) Having lost much of his right occipital lobe to a tumor removal, a friend of mine [DM’s] was blind to the left half of his field of vision. Visual information travels from the occipital lobes to other areas that specialize in tasks such as identifying words, detecting emotions, and recognizing faces.

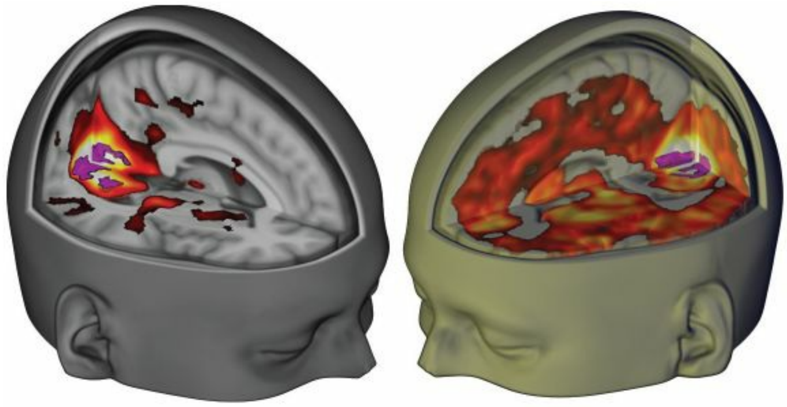


Figure 12.5
Imperial College London

Figure 12.5 Seeing without eyes

The psychoactive drug LSD often produces vivid *hallucinations*. Why? It dramatically increases communication between the visual cortex in the occipital lobe and other brain regions. The fMRI (functional MRI) scan above right shows, a research participant with closed eyes who is under the influence of LSD (color represents increased bloodflow). The fMRI above left shows the same person when given a placebo (Carhart-Harris et al., 2016; Cormier, 2016).

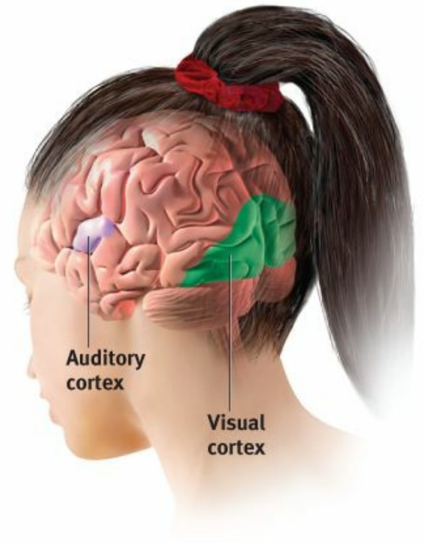


Figure 12.6
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Figure 12.6 The visual cortex and auditory cortex

The visual cortex in the occipital lobes at the rear of your brain receives input from your eyes. The auditory cortex in your temporal lobes—above your ears—receives information from your ears.

Any sound you now hear is processed by your auditory cortex in your temporal lobes (just above your ears; see Figure 12.6). Most of this auditory information travels a circuitous route from one ear to the auditory receiving area above your opposite ear. If stimulated in your auditory cortex, you might hear a sound. MRI scans of people with schizophrenia have revealed active auditory areas in the temporal lobes during the false sensory experience of auditory *hallucinations* (Lennox et al., 1999). Even the phantom ringing sound experienced by people with hearing loss is—if heard in one ear—associated with activity in the temporal lobe on the brain's opposite side (Muhlnickel, 1998).

Association Areas

So far, we have pointed out small cortical areas that either receive sensory input or direct muscular output. Together, these occupy about one-fourth of the human brain's thin, wrinkled cover. What, then, goes on in the remaining vast regions of the cortex? In these **association areas** (identified in the Thinking Critically About box below), neurons are busy with higher mental functions—many of the tasks that make us human. Electrically probing an association area won't trigger any observable response. So, unlike the somatosensory and motor areas, association area functions cannot be neatly mapped. Does this mean we don't use them? See Thinking Critically About: Using More Than 10 Percent of Our Brain.

association areas

areas of the cerebral cortex that are not involved in primary motor or sensory functions; rather, they are involved in higher mental functions such as learning, remembering, thinking, and speaking.

Association areas are found in all four lobes. The *prefrontal cortex* in the forward part of the frontal lobes enables judgment, planning, and processing of new memories (de la Vega et al., 2016). People with damaged frontal lobes may have high intelligence test scores and great cake-baking skills. Yet they would not be able to plan ahead to *begin* baking a cake for a birthday party (Huey et al., 2006). And if they did begin to bake, they might forget the recipe (MacPherson et al., 2016).

Frontal lobe damage also can alter personality and remove a person's inhibitions. Consider the classic case of railroad worker Phineas Gage. One afternoon in 1848, Gage, then 25 years old, was using a tamping iron to pack gunpowder into a rock. A spark ignited the gunpowder, shooting the rod up through his left cheek and out the top of his skull, leaving his frontal lobes damaged (**Figure 12.7**). To everyone's amazement, Gage was immediately able to sit up and speak, and after the wound healed, he returned to work. But having lost some of the neural tracts that enabled his frontal lobes to control his emotions, the affable, soft-spoken man was now irritable, profane, and dishonest (Van Horn et al., 2012). This person, said his friends, was "no longer Gage." His mental abilities and memories were unharmed, but his personality was not. Gage later lost his railroad job, but over time, he adapted to his injury and found work as a stagecoach driver (Macmillan & Lena, 2010).

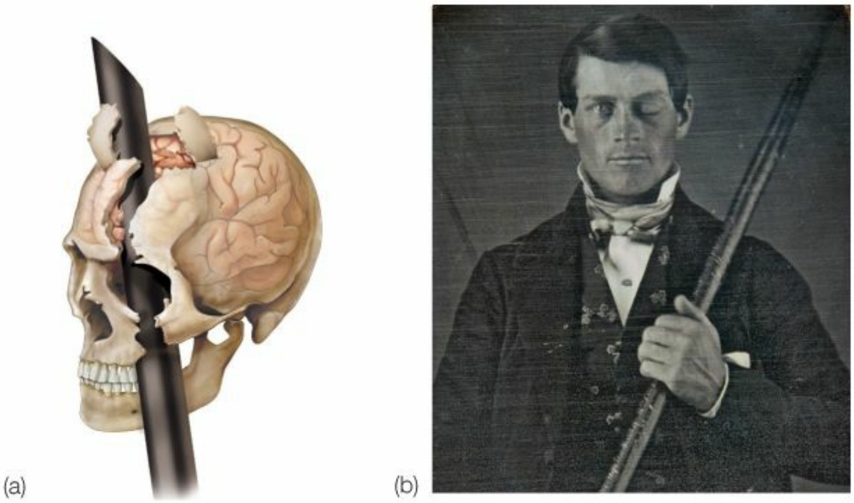
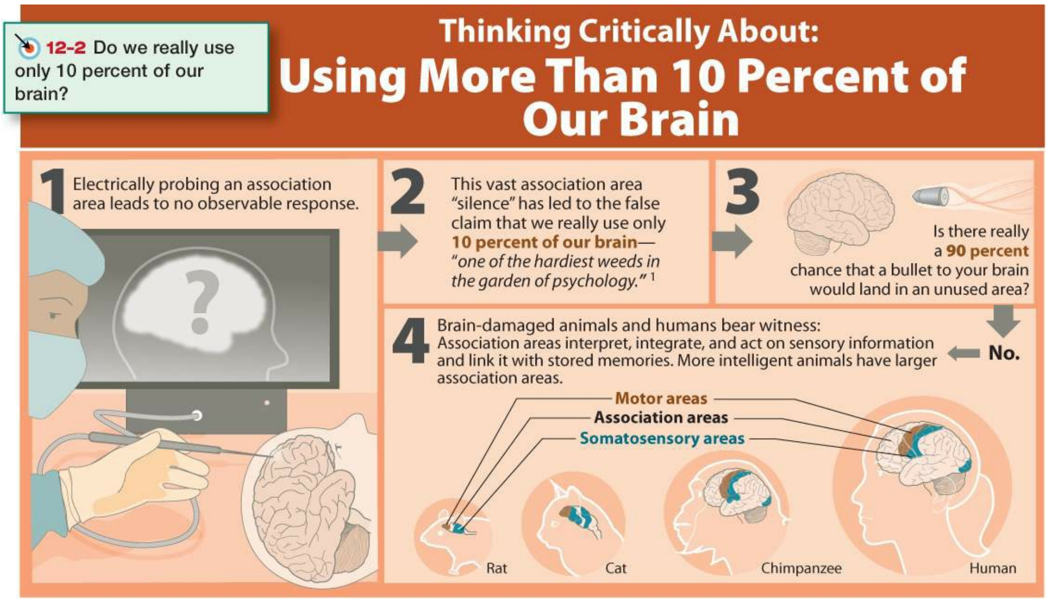


Figure 12.7
Warren Anatomical Museum in the Francis A. Countway Library of Medicine. Gift of Jack and Beverly Wilgus

Figure 12.7 A blast from the past

(a) Phineas Gage's skull was kept as a medical record. Using measurements and modern neuroimaging techniques, researchers have reconstructed the probable path of the rod through Gage's brain (Van Horn et al., 2012). (b) This photo shows Gage after his accident. (The image has been reversed to show the features correctly. Early photos, including this one, were actually mirror images.)



12-2 Do we really use only 10 percent of our brain?

Thinking Critically About:

Using More Than 10 Percent of Our Brain

1 Electrically probing an association area leads to no observable response.

2 This vast association area "silence" has led to the false claim that we really use only **10 percent of our brain**—*"one of the hardiest weeds in the garden of psychology."*[1]

3 Is there really a **90 percent** chance that a bullet to your brain would land in an unused area?

No.

4 Brain-damaged animals and humans bear witness: Association areas interpret, integrate, and act on sensory information and link it with stored memories. More intelligent animals have larger association areas.

[1] McBurney, 1996, p. 44

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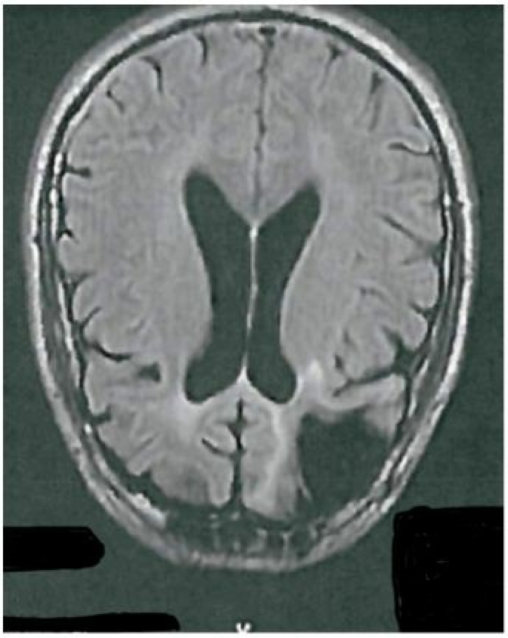
Studies of others with damaged frontal lobes have revealed similar impairments. Not only may they become less inhibited (without the frontal lobe brakes on their impulses), but their moral judgments may seem unrestrained. Cecil Clayton lost 20 percent of his left frontal lobe in a 1972 sawmill accident. Thereafter, his intelligence test score dropped to an elementary school level and he displayed increased impulsivity. In 1996, he fatally shot a deputy sheriff. In 2015, when he was 74, the State of Missouri executed him (Williams, 2015).



Cecil Clayton's brain scan, included with request for stay of execution filed with the Supreme Court, showing a missing portion of his frontal lobe.

Missing frontal lobe brakes With part of his left frontal lobe (in this downward-facing brain scan) lost to injury, Cecil Clayton became more impulsive and killed a deputy sheriff. Nineteen years later, his state executed him for this crime.

Would you advocate pushing one person in front of a runaway trolley to save five others? Most people would not, but those with damage to the prefrontal cortex are often untroubled by such ethical dilemmas (Koenigs et al., 2007). The frontal lobes help steer us away from violent actions (Molenberghs et al., 2015; Yang & Raine, 2009). With their frontal lobes ruptured, people's moral compass seems to disconnect from their behavior.

Association areas also perform other mental functions. The parietal lobes, parts of which were large and unusually shaped in Einstein's normal-weight brain, enable mathematical and spatial reasoning (Burrell, 2015; Ibos & Freedman, 2014). Stimulation of one parietal lobe area in brain-surgery patients produced a feeling of wanting to move an upper limb, the lips, or the tongue without any actual movement. With increased stimulation, patients falsely believed they *had* moved. Curiously, when surgeons stimulated a different association area near the motor cortex in the frontal lobes, the patients did move but had no awareness of doing so (Desmurget et al., 2009). These head-scratching findings suggest that our perception of moving flows not from the movement itself but rather from our intention and the results we expected.

On the underside of the right temporal lobe, another association area enables us to recognize faces. If a stroke or head injury destroyed this area of your brain, you would still be able to describe facial features and to recognize someone's gender and approximate age, yet be strangely unable to identify the person as, say, Taylor Swift, or even your grandmother.

Nevertheless, to reemphasize, we should be wary of using pictures of brain "hot spots" to create a new phrenology that locates complex functions in precise brain areas (Beck, 2010; Shimamura, 2010; Uttal, 2001). During a complex task, a brain scan shows many islands of brain activity working together—some running automatically in the background, and others under conscious control (Chein & Schneider, 2012).

FYI

For information on how distinct neural networks in your brain coordinate to enable language, see Module 36.

Similarly, the acquisition, development, and use of language depends on both specialized neural networks and their integration. Nineteenth-century research by French physician Paul Broca and German investigator Carl Wernicke led to the discovery of specialized language brain areas. Damage to *Broca's area* disrupts speaking, while damage to *Wernicke's area* disrupts understanding. Today's neuroscience, however, has shown that language functions are distributed across other brain areas as well.

Your memory, language, and attention result from the synchronized activity among distinct brain areas and neural networks (Knight, 2007). Ditto for religious experience. More than 40 distinct brain regions become active in different religious states, such as prayer and meditation, indicating that there is no simple "God spot" (Fingelkurts & Fingelkurts, 2009). *The point to remember:* Our mental experiences arise from coordinated brain activity.

✓ Check Your Understanding

Ask Yourself

- Before reading this section, were you under the impression that we use only around 10 percent of our brain? Did learning about the functions of association areas surprise you?

Test Yourself

- Our brain’s _______________ cortex registers and processes body touch and movement sensations. The _______________ cortex controls our voluntary movements.
- Why are association areas important?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

The Power of Plasticity

Biology and Experience Interact

12-3 How does our brain adjust to new experiences?

Your brain is sculpted not only by your genes but also by your life. Under the surface of your awareness, your brain is constantly changing, building new pathways as it adjusts to little mishaps and new experiences. This neural change is called **plasticity**, and although this ability is strongest in childhood, it continues throughout life (Gutchess, 2014). To see plasticity at work, consider London’s taxi drivers.

plasticity
the brain’s ability to change, especially during childhood, by reorganizing after damage or by building new pathways based on experience.

How long do you think it would take to learn and remember 25,000 streets and their connections? It takes London’s taxi driver trainees two to four years. For the half who pass the difficult final test, big rewards are in store: a better income and also an enlarged hippocampus, one of the brain’s memory centers that processes spatial memories. London’s bus drivers, who navigate a smaller set of roads, gain no similar neural rewards (Maguire et al., 2000, 2006).

Your brain is a work in progress. With repeated practice, it develops unique patterns that reflect your experiences. Consider Daniel Kish, an enthusiastic adventurer and skilled cook who also happens to be completely blind. To “see” his surroundings, he has learned to use echolocation—clicking his tongue and listening to the sound’s reverberation (Kish, 2015). We also see plasticity in well-practiced pianists, who have a larger-than-usual auditory cortex area (a sound-processing region) that encodes piano sounds (Bavelier et al., 2000; Pantev et al., 1998). After years of practice, the brains of ballerinas and jugglers reflect their mastery (Draganski et al., 2004; Hänggi et al., 2010; Herholz & Zatorre, 2012). Your brain, too, is changing as it embodies the practice and dedication you're devoting to the ideas, skills, and people you care about the most. The brain you were born with is not the brain you will die with.

Plasticity is part of what makes the human brain unique (Gómez-Robles et al., 2015). More than for any other species, our flexible brain changes, in ways large and small. And thanks to those changes, we can adapt to our changing world.

Response to Damage

12-4 To what extent can a damaged brain reorganize itself, and what is neurogenesis?

So, what happens when we experience mishaps, big and little? Let's explore the brain's ability to modify itself after damage.

Most brain-damage effects can be traced to two hard facts: (1) Severed brain and spinal cord neurons, unlike cut skin, usually do not regenerate. (If your spinal cord were severed, you would probably be permanently paralyzed.) (2) Some brain functions seem preassigned to specific areas. One newborn who suffered damage to temporal lobe facial recognition areas was never able to recognize faces (Farah et al., 2000). But there is good news: Some of the brain's neural tissue can *reorganize* in response to damage.

Volker Corell Photography

The mind's eye Daniel Kish, who is completely blind, enjoys going for walks in the woods. To stay safe, he uses echolocation—the same navigation method used by bats and dolphins. Blind echolocation experts such as Kish engage the brain's visual centers to navigate their surroundings (Thaler et al., 2011, 2014). Although Kish is blind, his flexible brain helps him to "see."

Plasticity may also occur after serious damage, especially in young children (Kolb, 1989; see also **Figure 12.8**). The brain's plasticity is good news for those blind or deaf. Blindness or deafness makes unused brain areas available for other uses (Amedi et al., 2005). If a blind person uses one finger to read Braille, the brain area dedicated to that finger expands as the sense of touch invades the visual cortex that normally helps people see (Barinaga, 1992; Sadato et al., 1996). Plasticity also helps explain why some studies have found that deaf people who learned sign language before another language have enhanced peripheral and motion-detection vision (Bosworth & Dobkins, 1999; Shiell et al., 2014). In deaf people whose native language is sign, the temporal lobe area normally dedicated to hearing waits in vain for stimulation. Finally, it looks for other signals to process, such as those from the visual system.

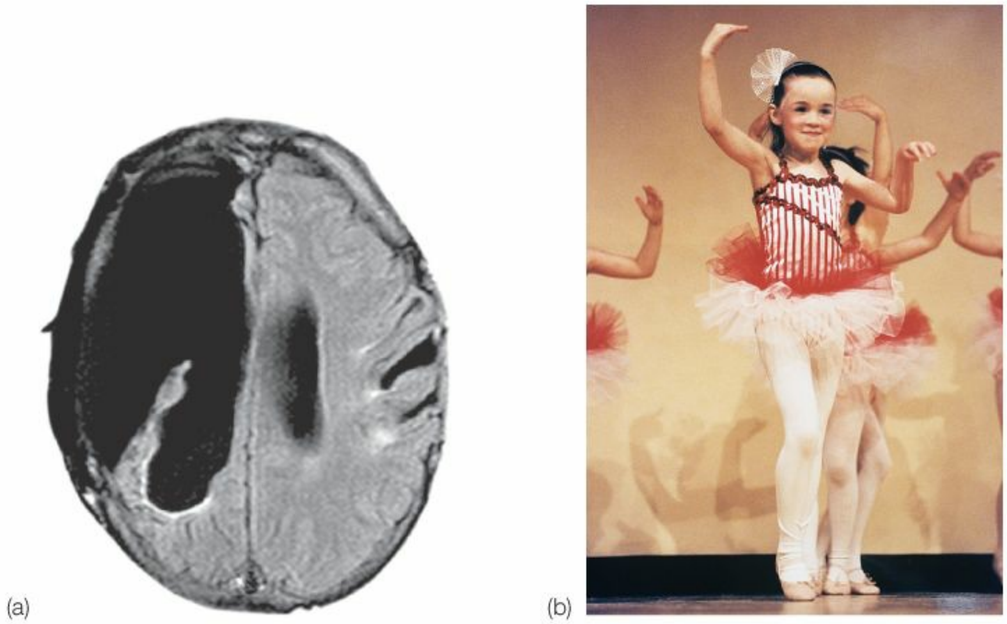


Figure 12.8
(a) Living Art Enterprises, LLC/Science Source, (b) Joe McNally/Hulton Archive/Getty Images

Figure 12.8 Brain work is child’s play

This 6-year-old had surgery to end her life-threatening seizures. Although most of an entire hemisphere was removed (see MRI of hemispherectomy at left), her remaining hemisphere compensated by putting other areas to work. One Johns Hopkins medical team reflected on the child hemispherectomies they had performed. Although use of the opposite arm was compromised, the team reported being “awed” by how well the children had retained their memory, personality, and humor (Vining et al., 1997). The younger the child, the greater the chance that the remaining hemisphere can take over the functions of the one that was surgically removed (Choi, 2008; Danelli et al., 2013).

Similar reassignment may occur when disease or damage frees up other brain areas normally dedicated to specific functions. If a slow-growing left hemisphere tumor disrupts language (which resides mostly in the left hemisphere), the right hemisphere may compensate (Thiel et al., 2006). If a finger is amputated, the somatosensory cortex that received its input will begin to receive input from the adjacent fingers, which then become more sensitive (Oelschläger et al., 2014).

Although the brain often attempts self-repair by reorganizing existing tissue, it sometimes attempts to mend itself through **neurogenesis**—producing new neurons. Researchers have found baby neurons deep in the brains of adult mice, birds, monkeys, and humans (He & Jin, 2016; Jessberger et al., 2008). These neurons may then migrate elsewhere and form connections with neighboring neurons (Aimone et al., 2010; Egeland et al., 2015; Gould, 2007).

neurogenesis

the formation of new neurons.

Cold War nuclear tests between 1945 and 1963 oddly later enabled scientists to confirm the birth of new brain neurons. The blasts released radioactive carbon isotopes, which, for those exposed, carbon-dated neurons in the hippocampus, a brain center crucial to memory formation. By detecting neurons birthed since then, researchers discovered that 700 new hippocampus neurons are born daily, making nearly a 2 percent annual turnover rate (Kempermann, 2013; Spalding et al., 2013). Our bombs taught us something about our brain.

Master stem cells that can develop into any type of brain cell have also been discovered in the human embryo. If mass-produced in a lab and injected into a damaged brain, might neural stem cells turn themselves into replacements for lost brain cells? Researchers at universities and biotech companies continue to break new ground on how to produce stem cells that resemble functioning human neurons (Lu et al., 2016; Paşca et al., 2015). Such stem cell research not only helps treat the diseased or damaged brain but also aids understanding of brain development, memory, and other basic psychological processes (Mariani et al., 2012; Sun et al., 2015; Zhang et al., 2016). Might surgeons someday be able to rebuild damaged brains, much as we reseed damaged lawns? Stay tuned. In the meantime, we can all benefit from natural promoters of neurogenesis, such as exercise, sleep, and nonstressful but stimulating environments (Iso et al., 2007; Leuner et al., 2010; Pereira et al., 2007; Sexton et al., 2016;

Stranahan et al., 2006).

Check Your Understanding

Ask Yourself

- Has what you have learned about how our brain enables our mind affected your view of human nature?

Test Yourself

- Try moving your right hand in a circular motion, as if cleaning a table. Then start your right foot doing the same motion, synchronized with your hand. Now reverse the right foot's motion, but not the hand's. Finally, try moving the *left* foot opposite to the right hand.

  1. Why is reversing the right foot's motion so hard?
  2. Why is it easier to move the left foot opposite to the right hand?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 12 REVIEW

12-1 What four lobes make up the cerebral cortex, and what are the functions of the motor cortex, somatosensory cortex, and association areas?

- The *cerebral cortex* has two hemispheres, and each hemisphere has four lobes: the *frontal*, *parietal*, *occipital*, and *temporal*. Each lobe performs many functions and interacts with other areas of the cortex.
- The *motor cortex*, at the rear of the frontal lobes, controls voluntary movements.
- The *somatosensory cortex*, at the front of the parietal lobes, registers and processes body touch and movement sensations.
- Body parts requiring precise control or those that are especially sensitive occupy the greatest amount of space in the motor cortex and somatosensory cortex, respectively.
- Most of the brain's cortex—the major portion of each of the four lobes—is devoted to uncommitted *association areas*, which integrate information involved in learning, remembering, thinking, and other higher-level functions.
- Our mental experiences arise from coordinated brain activity.

12-2 Do we really use only 10 percent of our brain?

- The unresponsiveness of our *association areas* to electrical probing led to the false claim that we only use 10 percent of our brain.
- In reality, these vast brain areas are responsible for interpreting, integrating, and acting on sensory information and linking it with stored memories.

12-3 How does our brain adjust to new experiences?

- *Plasticity* enables our brain to adjust to new experiences. While this is a lifelong ability, plasticity is greatest in childhood.
- With practice, our brain develops unique patterns that reflect our life experiences.

12-4 To what extent can a damaged brain reorganize itself, and what is neurogenesis?

- While brain and spinal cord neurons usually do not regenerate, some neural tissue can *reorganize* in response to damage.
- Reassignment of functions to different areas of the brain may also occur in blindness and deafness, or as a result of disease.
- The brain sometimes mends itself by forming new neurons, a process known as *neurogenesis.*

Multiple-Choice Questions

1. Damage to which of the following could interfere with the ability to plan for the future?

a. Frontal lobe
b. Temporal lobe
c. Parietal lobe
d. Occipital lobe
e. Somatosensory cortex

2. Paul is having difficulty understanding what his wife is saying. Which of the following areas is most likely damaged?

a. The frontal lobe
b. The parietal lobe
c. The occipital lobe
d. Wernicke’s area
e. Broca’s area

3. Stimulation of which of the following may cause a person to involuntarily move their arm?

a. Somatosensory cortex
b. Motor cortex
c. Glial cells
d. Reticular activating system
e. Visual cortex

4. Which lobe of the brain is located in the top rear of the brain?

a. Occipital
b. Parietal
c. Frontal
d. Temporal
e. Corpus callosum

5. The most noticeable difference between human brains and other mammalian brains is the size of the

a. association areas.
b. frontal lobe.
c. glial cells.
d. reticular activating system.
e. visual cortex.

6. Cognitive neural prosthetics are placed in the brain to help control parts of the

a. motor cortex.
b. auditory cortex.
c. somatosensory cortex.
d. visual cortex.
e. olfaction areas.

7. The ability of our brain to adapt to damage, where one area may take over the function of the damaged area, is due to

a. lesioning.
b. positron emission training.
c. Broca’s area.

d. Wernicke’s area.
e. plasticity.

8. Neurogenesis is the process by which

a. one brain structure takes on the functions of an adjacent structure.
b. our brain creates new neurons.
c. the amygdala and thalamus work together to keep the body awake and alert.
d. association areas expand as new material is learned.
e. the brain adapts to new learning.

Practice FRQs

1. Doctors sometimes have to remove a portion of the brain to control life-threatening seizures. Describe what the results of the removal of a portion of the somatosensory cortex would be and explain how this procedure might be affected by brain plasticity.

Answer

1 point: Removing part of the somatosensory cortex would result in a lack of sensation/inability to feel being touched in the parts of the body associated with the removed tissue. Page 113

1 point: Because of brain plasticity, the person’s brain may be able to change and reorganize new pathways based on experience. This is more likely if the person is a child. Page 116

2. Anthony plays in a high school band concert. Identify one way that each lobe of his brain is active as he participates in the concert.

(4 points)

Module **13 Brain Hemisphere Organization and the Biology of Consciousness**

LEARNING TARGETS

- 13-1 Explain what split brains reveal about the functions of our two brain hemispheres.
- 13-2 Discuss the dual processing being revealed by today's cognitive neuroscience.

The Divided Brain

13-1 What do split brains reveal about the functions of our two brain hemispheres?

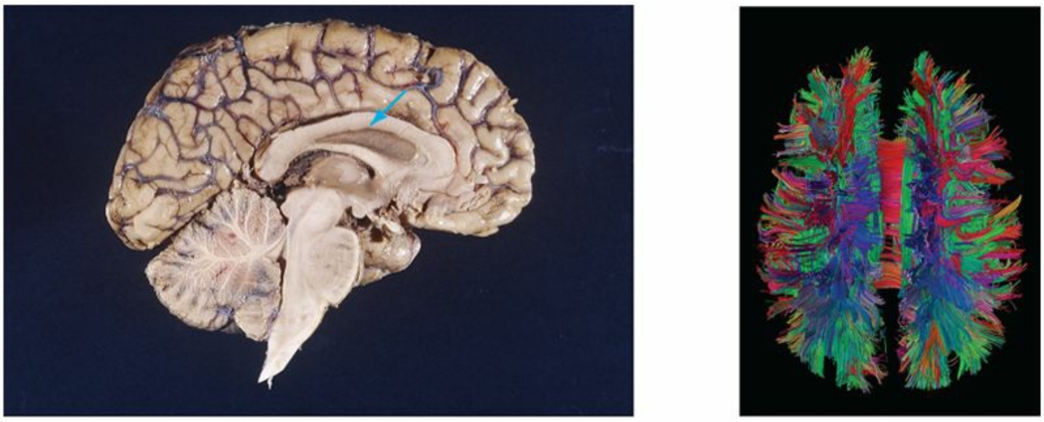
Our brain's look-alike left and right hemispheres serve differing functions. This *lateralization* is apparent after brain damage. Research spanning more than a century has shown that left hemisphere accidents, strokes, and tumors can impair reading, writing, speaking, arithmetic reasoning, and understanding. Similar right hemisphere damage has less visibly dramatic effects. Does this mean that the right hemisphere is just along for the ride? Many believed this was the case until the 1960s, when a fascinating chapter in psychology's history began to unfold: Researchers found that the "minor" right hemisphere was not so limited after all.

Splitting the Brain

Flip It Video: Split-Brain Research

In 1961, Los Angeles neurosurgeons Philip Vogel and Joseph Bogen speculated that major epileptic seizures were caused by an amplification of abnormal brain activity bouncing back and forth between the two cerebral hemispheres, which work together as a whole system. If so, they wondered, could they end this biological tennis match by severing the **corpus callosum**, the wide band of axon fibers connecting the two hemispheres and carrying messages between them (see **Figure 13.1**)? Vogel and Bogen knew that psychologists Roger Sperry, Ronald Myers, and Michael Gazzaniga had divided cats' and monkeys' brains in this manner, with no serious ill effects.

corpus callosum [KOR-pus kah-LOW-sum]
the large band of neural fibers connecting the two brain hemispheres and carrying messages between them.



(a)

(b)

Figure 13.1

(a) Martin M. Rotker/Science Source, (b) Dr. Patric Hagmann/CHUV, UNIL, Lausanne, Switzerland

Figure 13.1 The corpus callosum

This large band of neural fibers connects the two brain hemispheres. To photograph the half brain on the left, a surgeon separated the hemispheres by cutting through the corpus callosum (see blue arrow) and lower brain regions. The high-resolution diffusion spectrum image on the right, showing a top-facing brain from above, reveals brain neural networks within the two hemispheres and the corpus callosum neural bridge between them.

So the surgeons operated. The result? The seizures all but disappeared. The patients with these **split brains** were surprisingly normal, their personality and intellect hardly affected. Waking from surgery, one even joked that he had a “splitting headache” (Gazzaniga, 1967). By sharing their experiences, these patients have greatly expanded our understanding of interactions between the intact brain’s two hemispheres.

split brain

a condition resulting from surgery that isolates the brain’s two hemispheres by cutting the fibers (mainly those of the corpus callosum) connecting them.

To appreciate these findings, we need to focus for a minute on the peculiar nature of our visual wiring, illustrated in **Figure 13.2**. Note that each eye receives sensory information from the entire visual field. But in each eye, information from the left half of your field of vision goes to your right hemisphere, and information from the right half of your visual field goes to your left hemisphere, which usually controls speech. Information received by either hemisphere is quickly transmitted to the other across the corpus callosum. In a person with a severed corpus callosum, this information sharing does not take place.

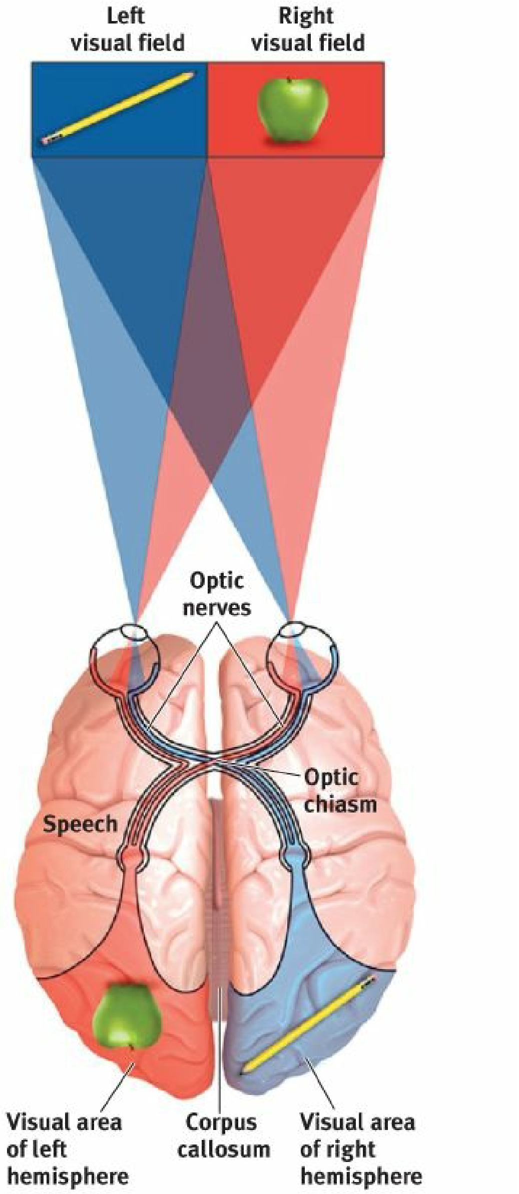

Left visual field
Right visual field
Optic nerves
Optic chiasm
Speech
Visual area of left hemisphere
Corpus callosum
Visual area of right hemisphere

Figure 13.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 13.2 **The information highway from eye to brain**

Knowing these facts, Sperry and Gazzaniga could send information to a patient’s left or right hemisphere. As the person stared at a spot, they flashed a stimulus to its right or left. They could do this with you, too, but in your intact brain, the hemisphere receiving the information would instantly pass the news to the other side. Because the split-brain surgery had cut the communication lines between the hemispheres, the researchers could, with these patients, quiz each hemisphere separately.

In an early experiment, Gazzaniga (1967) asked split-brain patients to stare at a dot as he flashed HE·ART on a screen (**Figure 13.3**). Thus, HE appeared in their left visual field (which transmits to the right hemisphere) and ART in the right field (which transmits to the left hemisphere). When he then asked them to *say* what they had seen, the patients reported that they had seen ART. But when asked to *point* to the word they had seen, they were startled when their left hand (controlled by the right hemisphere) pointed to HE. Given an opportunity to express itself, each hemisphere indicated what it had seen. The right hemisphere (controlling the left hand) intuitively knew what it could not verbally report.

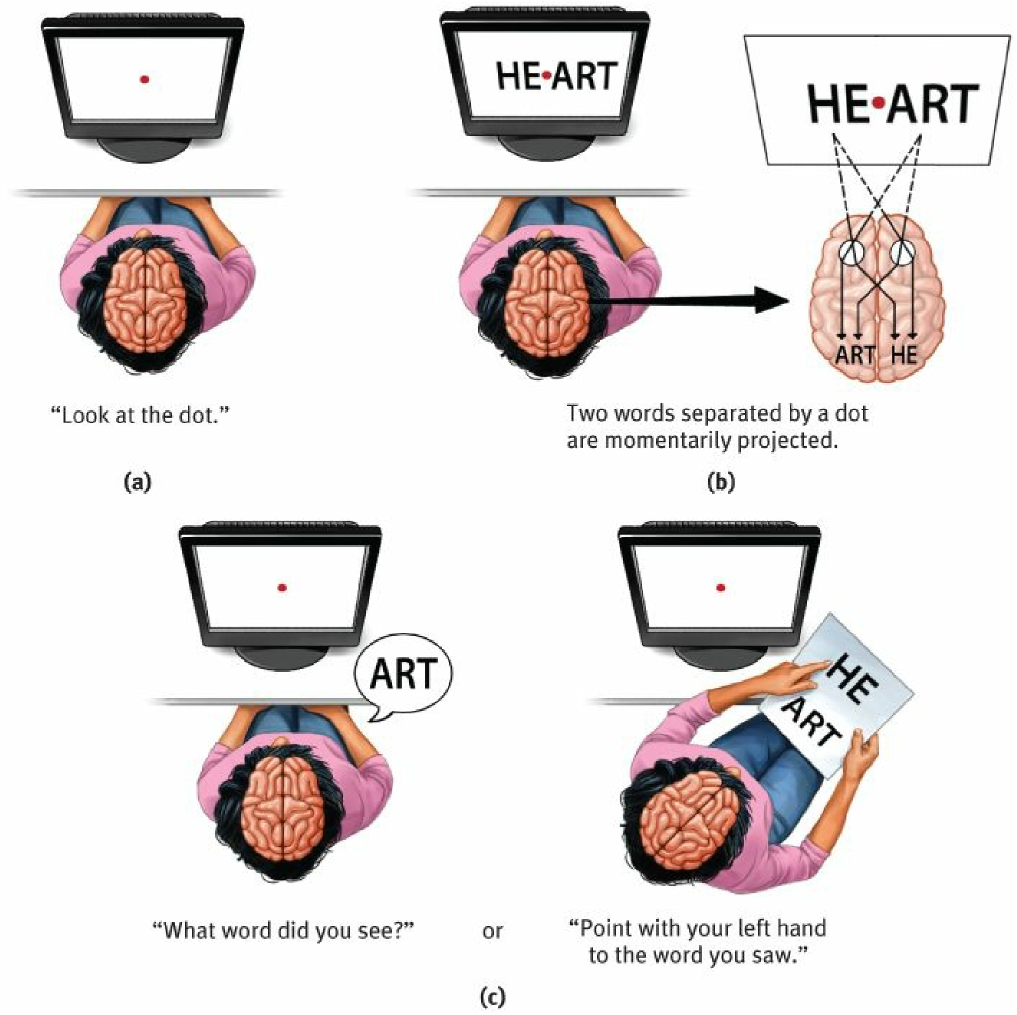

HE•ART
HE•ART
ART
HE
"Look at the dot."
(a)
Two words separated by a dot are momentarily projected.
(b)
ART
HE
ART
"What word did you see?"
or
"Point with your left hand to the word you saw."
(c)

Figure 13.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
From Gazzaniga, 1983.

Figure 13.3 One skull, two minds

When an experimenter flashes the word HEART across the visual field, a woman with a split brain verbally reports seeing the portion of the word transmitted to her left hemisphere. However, if asked to indicate with her left hand what she saw, she points to the portion of the word transmitted to her right hemisphere (Gazzaniga, 1983).

AP® EXAM TIP

The classic split-brain studies are likely to show up on the AP® exam.

When a picture of a spoon was flashed to their right hemisphere, the patients could not *say* what they had viewed. But when asked to *identify* what they had viewed by feeling an assortment of hidden objects with their left hand, they readily selected the spoon. If the experimenter said, “Correct!” the patient might reply, “What? Correct? How could I possibly pick out the correct object when I don’t know what I saw?” It is, of course, the left hemisphere doing the talking here, bewildered by what the nonverbal right hemisphere knows.

> “*Do not let your left hand know what your right hand is doing.*”
>
> *Matthew 6:3*

A few people who have had split-brain surgery have been for a time bothered by the unruly independence of their left hand. It seemed the left hand truly didn’t know what the right hand was doing. The left hand might unbutton a shirt while the right hand buttoned it, or put grocery store items back on the shelf after the right hand put them in the cart. It was as if each hemisphere was thinking “I’ve half a mind to wear my green (blue) shirt today.” Indeed, said Sperry (1964), split-brain surgery leaves people “with two separate minds.” With a split brain, both hemispheres can comprehend and follow an instruction to copy—*simultaneously*—different figures with the left and right hands (Franz et al., 2000; see also **Figure 13.4**). (Reading these reports, can you imagine a patient enjoying a solitary game of “rock, paper, scissors”—left versus right hand?)

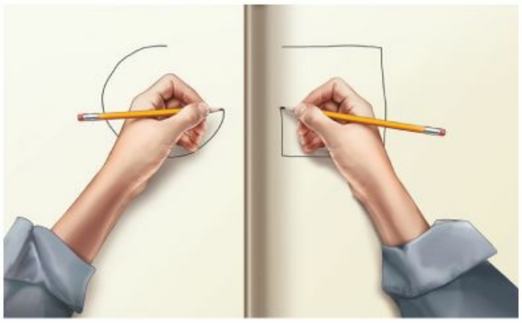


Figure 13.4
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Figure 13.4 Try this!

People who have had split-brain surgery can simultaneously draw two different shapes.

When the "two minds" are at odds, the left hemisphere does mental gymnastics to rationalize reactions it does not understand. If a patient follows an order ("Walk") sent to the right hemisphere, a strange thing happens. The left hemisphere, unaware of the order, doesn't know why the patient begins walking. But if asked, the patient doesn't reply, "I don't know." Instead, the left hemisphere improvises—"I'm going into the house to get a Coke." Gazzaniga (1988), who described these patients as "the most fascinating people on earth," realized that the conscious left hemisphere resembles an interpreter that instantly constructs explanations. The brain, he concluded, often runs on autopilot; it acts first and then explains itself.

✓ Check Your Understanding

Ask Yourself

- Can you imagine yourself in the shoes of a split-brain patient? What would it be like to have knowledge which you were unaware of and couldn't verbally report but were nonetheless able to act on?

Test Yourself

- (1) If we flash a red light to the right hemisphere of a right-handed person with a split brain, and flash a green light to the left hemisphere, will each observe its own color? (2) Will the person be aware that the colors differ? (3) What will the person verbally report seeing?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Right-Left Differences in the Intact Brain

So, what about the 99.99+ percent of us with undivided brains? Does each of *our* hemispheres also perform distinct functions? The short answer is *Yes*. When a person performs a *perceptual* task, a brain scan often reveals increased activity (brain waves, bloodflow, and glucose consumption) in the *right* hemisphere. When the person speaks or does a math calculation, activity usually increases in the *left* hemisphere.

A dramatic demonstration of hemispheric specialization happens before some types of brain surgery. To locate the patient’s language centers, the surgeon injects a sedative into the neck artery feeding blood to the left hemisphere, which usually controls speech. Before the injection, the patient is lying down, arms in the air, chatting with the doctor. Can you predict what probably happens when the drug puts the left hemisphere to sleep? Within seconds, the person’s right arm falls limp. If the left hemisphere is controlling language, the patient will be speechless until the drug wears off. If the drug is injected into the artery to the right hemisphere, the left arm will fall limp, but the person will still be able to speak.

To the brain, language is language, whether spoken or signed. Just as hearing people usually use the left hemisphere to process spoken language, deaf people use the left hemisphere to process sign language (Corina et al., 1992; Hickok et al., 2001). Thus, a left hemisphere stroke disrupts a deaf person’s signing, much as it would disrupt a hearing person’s speaking (Corina, 1998).

AP® EXAM TIP

Notice that David Myers and Nathan DeWall never refer to your left brain or your right brain. You have two brain hemispheres, each with its own responsibilities, *but you only have one brain.* It’s very misleading when the popular press refers to the left brain and the right brain, and this happens frequently. When studying for the AP® exam, try to stay away from psychology myths.

Although the left hemisphere is skilled at making quick, literal interpretations of language, the right hemisphere

- *excels in making inferences* (Beeman & Chiarello, 1998; Bowden &

Beeman, 1998; Mason & Just, 2004). Primed with the flashed word *foot,* the left hemisphere will be especially quick to recognize the closely associated word *heel.* But if given an insight-like problem—“What word goes with *boot, summer,* and *ground*?”—the right hemisphere more quickly comes to a reasoned conclusion and recognizes the solution: *camp.* As one patient explained after a right hemisphere stroke, “I understand words, but I’m missing the subtleties.” The right side of the brain is also better than the left at copying drawings, recognizing faces, noticing differences, perceiving emotion, and expressing emotion through the more expressive left side of the face. Right hemisphere damage can greatly disrupt these abilities.

- *helps us modulate our speech* to make meaning clear—as when we say “Let’s eat, Grandpa” instead of “Let’s eat Grandpa” (Heller, 1990).
- *helps orchestrate our self-awareness.* People who suffer partial paralysis will sometimes stubbornly deny their impairment—strangely claiming they can move a paralyzed limb—if the damage is to the right hemisphere (Berti et al., 2005).

Simply looking at the two hemispheres, so alike to the naked eye, who would suppose they each contribute uniquely to the harmony of the whole? Yet a variety of observations—of people with split brains, of people with normal brains, and even of other species’ brains—converge beautifully, leaving little doubt that we have unified brains with specialized parts (Hopkins & Cantalupo, 2008; MacNeilage et al., 2009).

The Biology of Consciousness

13-2 What is the *dual processing* being revealed by today's cognitive neuroscience?

Today's science explores the biology of **consciousness**—our subjective awareness of ourselves and our environment. Evolutionary psychologists presume that consciousness offers a reproductive advantage (Barash, 2006; Murdik et al., 2011). Consciousness helps us cope with novel situations and act in our long-term interests rather than merely seeking short-term pleasure and avoiding pain. Consciousness also promotes our survival by anticipating how we seem to others and helping us read their minds: "He looks really angry! I'd better run!"

consciousness

our subjective awareness of ourselves and our environment.

Such explanations still leave us with what researchers call the "hard problem": How do brain cells jabbering to one another create our awareness of the taste of a taco, the idea of infinity, the feeling of fright? The question of how consciousness arises from the material brain is one of life's deepest mysteries.

Cognitive Neuroscience

Scientists assume, in the words of neuroscientist Marvin Minsky (1986, p. 287), that "the mind is what the brain does." We just don't know *how* it does it. Even with all the world's technology, we still don't have a clue *how* to make a conscious robot. Yet today's **cognitive neuroscience**—the interdisciplinary study of the brain activity linked with our mental processes—is relating specific brain states to conscious experiences (Koch et al., 2016).

cognitive neuroscience

the interdisciplinary study of the brain activity linked with cognition (including perception, thinking, memory, and language).

A stunning demonstration of consciousness appeared in brain scans of a noncommunicative patient—a 23-year-old woman who had been in a car accident and showed no outward signs of conscious awareness (Owen, 2014; Owen et al., 2006). When researchers asked her to *imagine* playing tennis, fMRI scans revealed activity in a brain area that normally controls arm and leg movements (**Figure 13.5**). Even in a motionless body, the researchers concluded, the brain—and the mind—may still be active. A follow-up analysis of 42 behaviorally unresponsive patients revealed 13 more who also showed meaningful though diminished brain responses to questions (Stender et al., 2014).

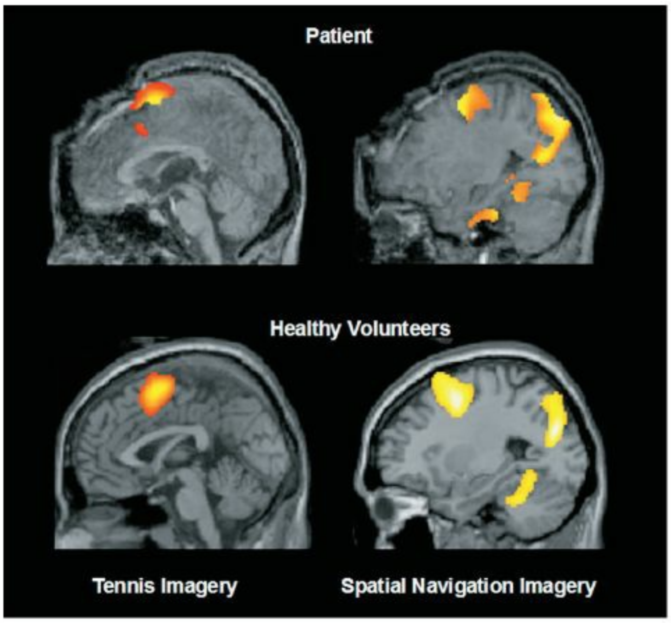

Figure 13.5
Courtesy of Adrian M. Owen, the Brain and Mind Institute, Western University

Figure 13.5 Evidence of awareness?

When asked to imagine playing tennis or navigating her home, a noncommunicative patient's brain (top) exhibited activity similar to a healthy person's brain (bottom). Researchers wonder if such fMRI scans might enable a "conversation" with some unresponsive patients, by instructing them, for example, to answer *yes* to a question by imagining playing tennis (top and bottom left), and *no* by imagining walking around their home (top and bottom right).

Many cognitive neuroscientists are exploring and mapping the conscious functions of the cortex. Based on your cortical activation patterns, they can now, in limited ways, read your mind (Bor, 2010). They could, for example, tell which of 10 similar objects (hammer, drill, and so forth) you were viewing (Shinkareva et al., 2008).

Conscious experience arises from synchronized activity across the brain (Chennu et al., 2014; Gaillard et al., 2009; Schurger et al., 2010). If a stimulus activates enough brain-wide coordinated neural activity—as strong signals in one brain area trigger activity elsewhere—it crosses a threshold for consciousness. A weaker stimulus—perhaps a word flashed too briefly to be consciously perceived—may trigger localized visual cortex activity that quickly fades. A stronger stimulus will engage other brain areas, such as those involved with language, attention, and memory. Such reverberating activity (detected by brain scans) is a telltale sign of conscious awareness (Boly et al., 2011; Silverstein et al., 2015). For example, awareness of your body involves communication between several brain areas (Blanke, 2012; Olivé et al., 2015). How the synchronized activity produces awareness—how matter makes mind—remains a mystery.

Dual Processing: The Two-Track Mind

Discovering which brain region becomes active with a particular conscious experience strikes many people as interesting, but not mind-blowing. If everything psychological is simultaneously biological, then our ideas, emotions, and spirituality must all, somehow, be embodied. What *is* mind-blowing to many of us is the growing evidence that we have, so to speak, two minds, each supported by its own neural equipment.

AP® EXAM TIP

Dual processing is another one of those big ideas that shows up in several units. Pay attention for the AP® exam!

At any moment, we are aware of little more than what's on the screen of our consciousness. But beneath the surface, unconscious information processing occurs simultaneously on many parallel tracks. When we look at a bird flying, we are consciously aware of the result of our cognitive processing ("It's a hummingbird!") but not of our subprocessing of the bird's color, form, movement, and distance. One of the grand ideas of recent cognitive neuroscience is that much of our brain work occurs off stage, out of sight. Perception, memory, thinking, language, and attitudes all operate on two levels—a conscious, deliberate "high road" and an unconscious, automatic "low road." The high road is reflective, the low road intuitive (Evans & Stanovich, 2013; Kahneman, 2011). Today's researchers call this **dual processing**. We know more than we know we know.

dual processing

the principle that information is often simultaneously processed on separate conscious and unconscious tracks.

If you are a driver, consider how you move to the right lane. Drivers know this unconsciously but cannot accurately explain it (Eagleman, 2011). Most say they would turn to the right, then straighten out—a procedure that would actually steer them off the road. In reality, an experienced driver, after moving right, automatically reverses the steering wheel just as far to the left of center, and only then returns to the center position. The lesson: The human brain is a device for converting conscious into unconscious knowledge.

Or consider this story, which illustrates how science can be stranger than science fiction. During my sojourns at Scotland's University of St Andrews, I [DM] came to know cognitive neuroscientists David Milner and Melvyn Goodale (2008). They studied a local woman, D. F., who suffered brain damage when overcome by carbon monoxide, leaving her unable to recognize and discriminate objects visually. Consciously, D. F. could see nothing. Yet she exhibited **blindsight**—she acted as though she could see. Asked to slip a postcard into a vertical or horizontal mail slot, she could do so without error. Asked the width of a block in front of her, she was at a loss, but she could grasp it with just the right finger-thumb distance. Likewise, if your right and left eyes view different scenes, you will only be consciously aware of one at a time. Yet you will display some blindsight awareness of the other (Baker & Cass, 2013).

blindsight

a condition in which a person can respond to a visual stimulus without consciously experiencing it.

How could this be? Don't we have one visual system? Goodale and Milner knew from animal research that the eye sends information simultaneously to different brain areas, which support different tasks (Weiskrantz, 2009, 2010). Sure enough, a scan of D. F.'s brain activity revealed normal activity in the area concerned with reaching for, grasping, and navigating objects, but damage in the area concerned with consciously recognizing objects.[1] (See another example in **Figure 13.6**.)

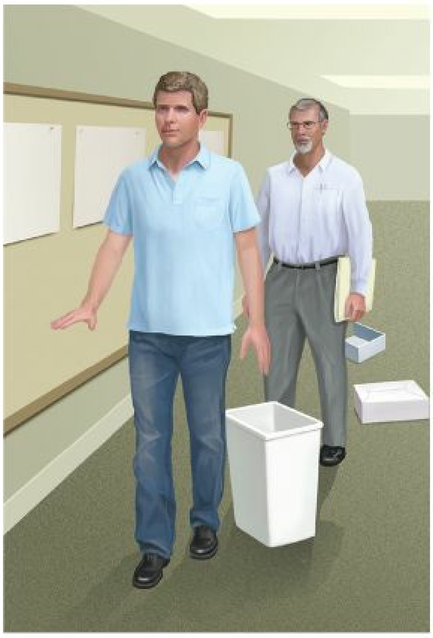

Figure 13.6
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Figure 13.6 When the blind can "see"

In this compelling demonstration of blindsight and the two-track mind, researcher Lawrence Weiskrantz trailed a blindsight patient down a cluttered hallway. Although told the hallway was empty, the patient meandered around all the obstacles without any awareness of them.

How strangely intricate is this thing we call vision, conclude Goodale and Milner in their aptly titled book, *Sight Unseen.* We may think of our vision as a single system that controls our visually guided actions. Actually, it is a dual-processing system (Foley et al., 2015). A *visual perception track* enables us "to think about the world"—to recognize things and to plan future actions. A *visual action track* guides our moment-to-moment movements.

The dual-track mind also appeared in a patient who lost all of his left visual cortex, leaving him blind to objects and faces presented on the right side of his field of vision. He nevertheless could sense the emotion expressed in faces, which he did not consciously perceive (De Gelder, 2010). The same is true of normally sighted people whose visual cortex has been disabled with magnetic stimulation. Such findings suggest that brain areas below the cortex are processing emotion-related information.

People often have trouble accepting that much of our everyday thinking, feeling, and acting operates outside our conscious awareness (Bargh & Chartrand, 1999). Some “80 to 90 percent of what we do is unconscious,” says Nobel laureate and memory expert Eric Kandel (2008). We are understandably inclined to believe that our intentions and deliberate choices rule our lives. But they don’t. Consciousness, though enabling us to exert voluntary control and to communicate our mental states to others, is but the tip of the information-processing iceberg. Just ask the volunteers who chose a card after watching a magician shuffle through the deck (Olson et al., 2015a). In nearly every case, the magician swayed participants’ decisions by subtly allowing one card to show for longer—but 91 percent of participants believed they had made the choice on their own. Being intensely focused on an activity (such as reading this module, we’d love to think) increases your total brain activity no more than 5 percent above its baseline rate. And even when you rest, activity whirls inside your head (Raichle, 2010).

Here’s another weird (and provocative) finding: Experiments show that when you move your wrist at will, you consciously experience the decision to move it about 0.2 seconds before the actual movement (Libet, 1985, 2004). No surprise there. But your brain waves jump about 0.35 seconds before you consciously perceive your decision to move! The startling conclusion: Consciousness sometimes arrives late to the decision-making party.

That inference has triggered more research and much debate. Does our brain really make decisions before we know about them? If so, is free will an illusion? Using fMRI scans, EEG recordings, or implanted electrodes, some studies seem to confirm that brain activity precedes—and helps predict—people’s decisions to press a button or to choose a card in a simplified poker game (Carter et al., 2012; Fried et al., 2011; Soon et al., 2008). Perhaps, as an everyday example of consciousness arriving after “most of the work has already been done” (Haynes, 2008), you can recall lying in bed in the morning, knowing you should get up. The bed feels good, so you linger . . . until suddenly you observe yourself throwing back the covers and sitting up. Did your brain decide to get up a microsecond before announcing the decision to your mind?

However, other studies indicate that brain activity continuously ebbs and flows, including during the experiments' predecision phase—regardless of whether the decision is made and executed (Parkinson & Haggard, 2015; Schurger et al., 2012). The actual decision to move occurs when the brain activity crosses a threshold, which coincides with the average "time of awareness of intention to move" (about 0.15 second before the movement). This view sees the mind's decision and the brain's activity, like a computer's problem solving and its electronic activity, as simultaneous and parallel.

Unconscious parallel processing is faster than conscious sequential processing, but both are essential. **Parallel processing** enables your mind to take care of routine business. **Sequential processing** is best for solving new problems, which requires our focused attention on one thing at a time. Try this: If you are right-handed, move your right foot in a smooth counterclockwise circle and write the number 3 repeatedly with your right hand—at the same time. Try something equally difficult: Tap a steady beat three times with your left hand while tapping four times with your right hand. Both tasks require conscious attention, which can be in only one place at a time. If time is nature's way of keeping everything from happening at once, then consciousness is nature's way of keeping us from thinking and doing everything at once.

parallel processing

processing many aspects of a problem simultaneously; generally used to process well-learned information or to solve easy problems.

sequential processing

processing one aspect of a problem at a time; generally used to process new information or to solve difficult problems.

Running on automatic pilot allows our consciousness—our mind's CEO—to monitor the whole system and deal with new challenges, while neural assistants automatically take care of routine business. Walking the familiar path to your next class, your feet do the work while your mind rehearses the presentation you're about to give. A skilled tennis player's brain and body respond automatically to an oncoming serve before becoming consciously aware of the ball's trajectory (which takes about three-tenths of a second). Ditto for other skilled athletes, for whom action precedes awareness. *The bottom line:* In everyday life, we mostly function like an automatic camera, but with a manual (conscious) override.

Great myths often engage simple pairs: good Cinderella and the evil stepmother, the slow Tortoise and fast Hare, the logical Sherlock Holmes and emotional Dr. Watson. The myths have enduring power because they express our human reality. Dualities are us.

✓ Check Your Understanding

Ask Yourself

- What are some examples of things you do on "automatic pilot"? What behaviors require your conscious attention?

Test Yourself

- Those working in the interdisciplinary field called _______________ _______________ study the brain activity associated with the mental processes of perception, thinking, memory, and language.
- What are the mind's two tracks, and what is *dual processing*?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 13 REVIEW

13-1 What do split brains reveal about the functions of our two brain hemispheres?

- *Split-brain* research (experiments on people with a severed *corpus callosum*) has confirmed that in most people, the left hemisphere is the more verbal and the right hemisphere excels in visual perception and the recognition of emotion.
- Studies of healthy people with intact brains confirm that each hemisphere makes unique contributions to the integrated functioning of the brain.

13-2 What is the *dual processing* being revealed by today's cognitive neuroscience?

- *Cognitive neuroscientists* and others studying the brain mechanisms underlying consciousness and cognition have discovered that the mind processes information on two separate tracks, one operating at an explicit, conscious level and the other at an implicit, unconscious level. This *dual processing* affects our perception, memory, attitudes, and other cognitions.
- While unconscious *parallel processing* is faster than conscious *sequential processing*, both are essential: Parallel processing enables us to take care of routine business, while sequential processing provides the focus we need to solve new problems.

Multiple-Choice Questions

1. A split-brain patient has a picture of a dog flashed to his right hemisphere and a cat to his left hemisphere. He will be able to identify the

a. cat using his right hand.
b. dog using his right hand.
c. dog using either hand.
d. cat using either hand.
e. cat using his left hand.

2. A split-brain patient has a picture of a dog flashed to his right hemisphere and a cat to his left hemisphere. Which of the following will he be able to verbalize?

a. That he saw a dog.
b. That he saw a cat.
c. That he saw both a dog and a cat.
d. That he did not see anything at all.
e. He will report the shape for a dog but not be able to name it as a dog.

3. You are aware that a dog is viciously barking at you, but you are not aware of the type of dog. Later, you are able to describe the type and color of the dog. This ability to process information without conscious awareness best exemplifies which of the following?

a. Split brain
b. Blindsight
c. Consciousness
d. Cognitive neuroscience
e. Dual processing

4. Which of the following is most likely to be a function of the left hemisphere?

a. Speech
b. Evaluating perceptual tasks
c. Making inferences
d. Identifying emotion in other people’s faces
e. Identifying one’s sense of self

5. The dual-processing model refers to which of the following ideas?

a. The right and left hemispheres of the brain both process incoming messages.

b. Incoming information is processed by both conscious and unconscious tracks.
c. Each lobe of the brain processes incoming information.
d. The brain first processes emotional information and then processes analytical information.
e. The thalamus and hypothalamus work together to analyze incoming sensory information.

6. Patients with a split brain have had which structure in their brain severed?

a. Thalamus
b. Corpus callosum
c. Pons
d. Cerebral cortex
e. Occipital lobe

Practice FRQs

1. Brain lateralization means that each hemisphere has its own functions. Give an example of both a left hemisphere and a right hemisphere function. Then explain how the two hemispheres communicate with one another.

Answer

1 point: Left hemisphere functions include language, math, and logic. Page 123

1 point: Right hemisphere functions include spatial relationships, facial recognition, and patterns. Page 123

1 point: The corpus callosum carries information back and forth between the two hemispheres. Page 120

2. Explain the difference between parallel and sequential processing and provide an example of how each is involved in your attention during your AP® Psychology course.

(4 points)

Module **14 Behavior Genetics: Predicting Individual Differences**

LEARNING TARGETS

- **14-1 Define *chromosomes, DNA, genes,* and the human *genome,* and describe how behavior geneticists explain our individual differences.**
- **14-2 Explain how twin and adoption studies help us understand the effects and interactions of nature and nurture.**
- **14-3 Explain what is meant by *heritability* and discuss how it relates to individuals and groups.**
- **14-4 Describe how molecular genetics research is changing our understanding of the effects of nature and nurture.**

What makes you you? In important ways, we are each unique. We are each a one-of-a-kind package of looks, language, personality, interests, and cultural background.

We are also the leaves of one tree. Our human family shares not only a common biological heritage—cut us and we bleed—but also common behavioral tendencies. Our shared brain architecture disposes us to sense the world, develop language, and feel hunger through identical mechanisms. Whether we live in the Arctic or the tropics, we prefer sweet tastes to sour. We divide the color spectrum into similar colors. And we feel drawn to behaviors that produce and protect offspring.

Our kinship also appears in our social behaviors. Whether named Gonzales, Nkomo, Ahmadi, Smith, or Wong, we start fearing strangers at about 8 months, and as adults we prefer the company of those with attitudes and attributes similar to our own. Coming from different parts of the globe, we know how to read one another's smiles and frowns. As members of one species, we affiliate, conform, return favors, punish offenses, organize hierarchies of status, and anguish over a child's death. A visitor from outer space could drop in anywhere and find humans dancing and feasting, singing and worshiping, playing sports and games, laughing and crying, living in families and forming groups. Taken together, such universal behaviors define our human nature.

What causes our striking diversity, and also our shared human nature? How much are our differences shaped by our differing genes? And how much by our *environment*—by every external influence, from maternal nutrition while in the womb to social support while nearing the tomb? To what extent are we formed by our upbringing? By our culture? By our current circumstances? By people's reactions to our genetic dispositions? By our own choices and efforts? This module and the next begin to tell the scientific story of how our genes (nature) and environments (nurture) together knit us.

Genes: Our Codes for Life

14-1 What are *chromosomes, DNA, genes,* and the human *genome?* How do behavior geneticists explain our individual differences?

So, if Beyoncé and Jay Z's daughter, Blue Ivy, grows up to be a popular recording artist, should we attribute her musical talent to her "superstar genes"? To her growing up in a musically rich environment? To high expectations? Such questions intrigue **behavior geneticists**, who study our differences and weigh the effects and the interplay of **heredity** and **environment**.

behavior genetics

the study of the relative power and limits of genetic and environmental influences on behavior.

heredity

the genetic transfer of characteristics from parents to offspring.

environment

every nongenetic influence, from prenatal nutrition to the people and things around us.

A Thousand Words Photography by Erica Corner

The nurture of nature Parents everywhere wonder: Will my baby grow up to be peaceful or aggressive? Plain or attractive? Successful or struggling at every step? What comes built in, and what is nurtured—and how? Research reveals that nature and nurture together shape our development—every step of the way.

Behind the story of our body and of our brain—surely the most awesome thing on our little planet—is the heredity that interacts with our experience to create both our universal nature and our individual and social diversity. Barely more than a century ago, few would have guessed that every cell nucleus in your body contains the genetic master code for your entire body. It's as if every room in Dubai's Burj Khalifa (the world's tallest building) contained a book detailing the architect's plans for the entire structure. The plans for your own book of life run to 46 chapters—23 donated by your mother's egg and 23 by your father's sperm. Each of these 46 chapters, called a **chromosome**, is composed of a coiled chain of the molecule **DNA** *(deoxyribonucleic acid)*. **Genes**, small segments of the giant DNA molecules, form the words of those chapters (**Figure 14.1**). Altogether, you have some 20,000 genes, which are either active *(expressed)* or inactive. Environmental events "turn on" genes, rather like hot water enabling a tea bag to express its flavor. When turned on, genes provide the code for creating *protein molecules,* our body's building blocks.

chromosomes

threadlike structures made of DNA molecules that contain the genes.

DNA (deoxyribonucleic acid)

a complex molecule containing the genetic information that makes up the chromosomes.

genes

the biochemical units of heredity that make up the chromosomes; segments of DNA capable of synthesizing proteins.

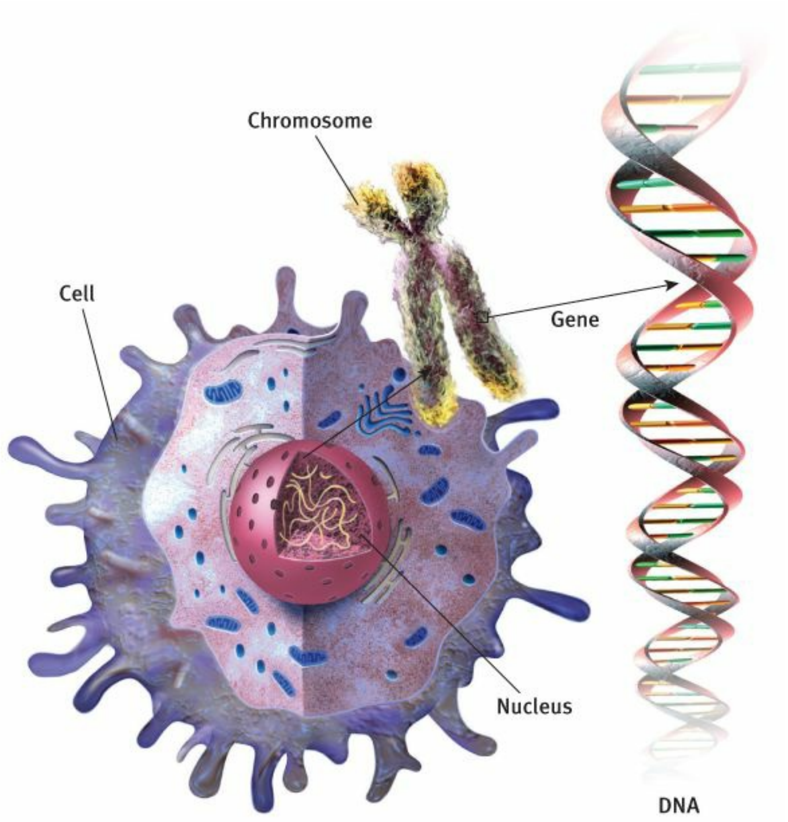


Figure 14.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
The New Yorker Collection, 1999 Danny Shanahan from cartoonbank.com. All rights reserved.

Figure 14.1 The life code

The nucleus of every human cell contains chromosomes, each of which is made up of two strands of DNA connected in a double helix. Genes are DNA segments that, when expressed (turned on), direct the development of proteins that influence a person's individual development.

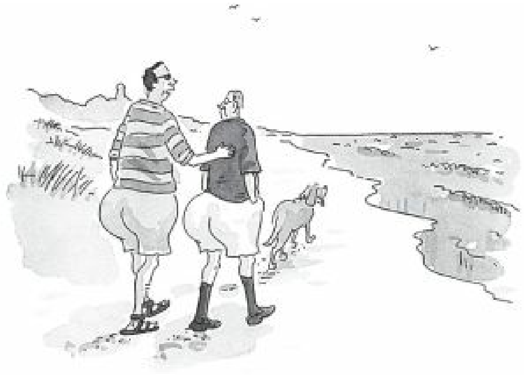
Genetically speaking, every other human is nearly your identical twin. Human **genome** researchers have discovered a common sequence within human DNA. This shared genetic profile is what makes us humans, rather than tulips, bananas, or chimpanzees.

genome
the complete instructions for making an organism, consisting of all the genetic material in that organism's chromosomes.

> “*We share half our genes with the banana.*”
>
> *Evolutionary biologist Robert May, president of Britain’s Royal Society, 2001*

Yet we aren’t all that different from our chimpanzee cousins. At a genetic level, humans and chimpanzees are 96 percent identical (Mikkelsen et al., 2005). At “functionally important” DNA sites, this number reaches 99.4 percent (Wildman et al., 2003)! Yet that wee 0.6 percent difference matters. It took a human, Shakespeare, to do what a chimpanzee cannot—intricately weave 17,677 words into literary masterpieces.

Small differences matter among other species, too. Common chimpanzees and bonobos resemble each other in many ways. They should—their genomes differ by much less than 1 percent. But they display markedly differing behaviors. Chimpanzees are aggressive and male dominated. Bonobos are peaceable and female led.



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“Thanks for almost everything, Dad.”

The occasional variations found at particular gene sites in human DNA fascinate geneticists and psychologists. Slight person-to-person variations from the common pattern give clues to our uniqueness—why one person has a disease that another does not, why one person is tall and another short, why one is anxious and another calm.

Most of our traits have complex genetic roots. How tall you are, for example, reflects the size of your face, vertebrae, leg bones, and so forth—each of which may be influenced by different genes interacting with your specific environment. Traits such as intelligence, happiness, and aggressiveness are each similarly influenced by many genes. Indeed, one of the big take-home findings of today’s behavior genetics is that there is no single smart gene, gay (or straight) gene, or schizophrenia gene. Rather, our differing traits are influenced by “many genes of small effect” (Okbay et al., 2016; Plomin et al., 2016).

> “*Your DNA and mine are 99.9 percent the same. . . . At the DNA level, we are clearly all part of one big worldwide family.*”
>
> *Francis Collins, Human Genome Project director, 2007*

So, our many genes help explain both our shared human nature and our human diversity. But—another take-home finding—knowing our heredity tells only part of our story. To form us, environmental influences interact with our genetic predispositions.

✓ Check Your Understanding

Ask Yourself

- Were you surprised to learn how genetically similar we are to our chimpanzee cousins? What was your impression *before* reading this section?

Test Yourself

- Put the following cell structures in order from smallest to largest: nucleus, gene, chromosome.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Twin and Adoption Studies

14-2 How do twin and adoption studies help us understand the effects and interactions of nature and nurture?

To scientifically tease apart the influences of heredity and environment, behavior geneticists could wish for two types of experiments. The first would control heredity while varying the home environment. The second would control the home environment while varying heredity. Although such experiments with human infants would be unethical, nature has done this work for us.

Identical Versus Fraternal Twins

Identical (monozygotic) twins develop from a single fertilized egg that splits. Thus they are *genetically* identical—nature's own human clones (**Figure 14.2**). Indeed, they are clones who share not only the same genes but the same conception and uterus, and usually the same birth date and cultural history. Two slight qualifications:

- Although identical twins have the same genes, they don't always have the same *number of copies* of those genes repeated within their genome. That variation helps explain why one twin may have a greater risk for certain illnesses and disorders, including schizophrenia (Maiti et al., 2011).
- Most identical twins share a placenta during prenatal development, but one of every three sets has separate placentas. One twin's placenta may provide slightly better nourishment, which may contribute to a few identical twin differences (Marceau et al. 2016; van Beijsterveldt et al., 2016).

identical (monozygotic) twins

develop from a single fertilized egg that splits in two, creating two genetically identical organisms.

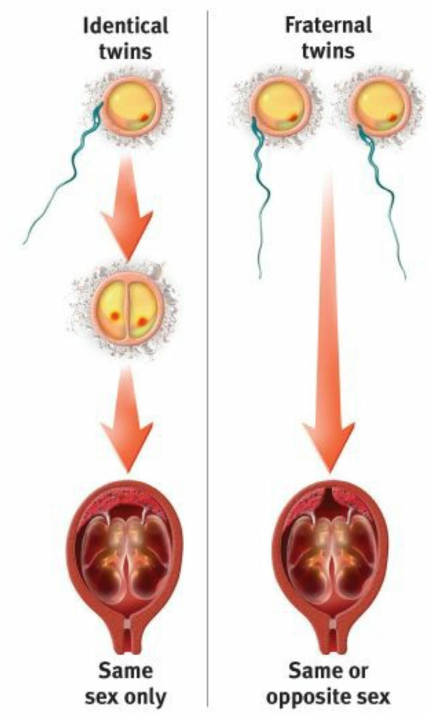


Figure 14.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 14.2 Same fertilized egg, same genes; different eggs, different genes

Identical twins develop from a single fertilized egg, fraternal twins from two.

Left: Ethel Wolvitz/The Image Works, Middle: Lee Snider/The Image Works, Right: Creatas Images/Getty Images

More twins Curiously, twinning rates vary by race. The rate among Caucasians is roughly twice that of Asians and half that of Africans. In Africa and Asia, most twins are identical. In Western countries, most twins are fraternal, and fraternal twins are increasing with the use of fertility drugs (Hall, 2003; Steinhauer, 1999).

Fraternal (dizygotic) twins develop from two separate fertilized eggs. As womb-mates, they share a prenatal environment, but they are genetically no more similar than ordinary brothers and sisters.

fraternal (dizygotic) twins

develop from separate fertilized eggs. They are genetically no closer than ordinary brothers and sisters, but they share a prenatal environment.

Shared genes can translate into shared experiences. A person whose identical twin has autism spectrum disorder, for example, has about a 3 in 4 risk of being similarly diagnosed. If the affected twin is fraternal, the co-twin has about a 1 in 3 risk (Ronald & Hoekstra, 2011). To study the effects of genes and environments, several thousand medical and psychological researchers have studied nearly 15 million identical and fraternal twin pairs (Polderman et al., 2015).

Are genetically identical twins also *behaviorally* more similar than fraternal twins? Studies of thousands of twin pairs in Germany, Australia, and the United States have found that identical twins are much more alike in *extraversion* (outgoingness) and *neuroticism* (emotional instability) than are fraternal twins (Kandler, 2011; Laceulle et al., 2011; Loehlin, 2012). Genes also influence many specific behaviors. For example, compared with rates for fraternal twins, drinking and driving convictions are 12 times greater among those who have an identical twin with such a conviction (Beaver & Barnes, 2012). As identical twins grow older, their behaviors remain similar (McGue & Christensen, 2013).

twinstrangers

Do look-alikes act alike? Genetically unrelated look-alikes, such as these doppelgangers, tend not to have notably similar personalities (Segal, 2013).

Identical twins, more than fraternal twins, look alike. So, do people's responses to their looks account for their similarities? *No.* In a clever approach, researcher (and twin) Nancy Segal (2013; Segal et al., 2013) compared personality similarity between identical twins and unrelated look-alike pairs. Only the identical twins reported similar personalities. Other studies have shown that identical twins whose parents treated them alike (for example, dressing them identically) were not psychologically more alike than identical twins who were treated less similarly (Kendler et al., 1994; Loehlin & Nichols, 1976). In explaining individual differences, genes matter.

FYI

Twins Lorraine and Levinia Christmas, driving to deliver Christmas presents to each other near Flitcham, England, collided (Shepherd, 1997).

Separated Twins

Imagine the following science fiction experiment: A mad scientist decides to separate identical twins at birth, then raise them in differing environments. Better yet, consider a *true* story:

In 1979, some time after divorcing, Jim Lewis awoke next to his second wife. Determined to make this marriage work, Jim made a habit of leaving love notes around the house. As he lay in bed he thought about others he had loved, including his son, James Alan, and his faithful dog, Toy.

Jim enjoyed spending part of the day in his basement woodworking shop building furniture, picture frames, and other items, including a white bench now circling a tree in his front yard. Jim also liked to drive his Chevy, watch stock-car racing, and drink Miller Lite beer.

Jim was basically healthy, except for occasional half-day migraine headaches and blood pressure that was a little high, perhaps related to his chain-smoking habit. He had become overweight a while back but had shed some of the pounds. Having undergone a vasectomy, he was done having children.

FYI

Sweden has the world's largest national twin registry—140,000 living and dead twin pairs—which forms part of a massive registry of 600,000 twins currently being sampled in the world's largest twin study (Wheelwright, 2004; www.genomeutwin.org).

What was extraordinary about Jim Lewis, however, was that at that same moment (we are not making this up) there existed another Jim—Jim Springer—for whom all these things (right down to the dog's name) were also true. The two Jims just happened, 38 years earlier, to have formed from two halves of the same fertilized egg. Thirty-seven days after their birth, these genetically identical twins were separated, adopted by blue-collar families, and raised with no contact or knowledge of each other's whereabouts until the day Jim Lewis received a call from his genetic clone (who, having been told he had a twin, set out to find him).

> “*In some domains it looks as though our identical twins reared apart are . . . just as similar as identical twins reared together. Now that's an amazing finding and I can assure you none of us would have expected that degree of similarity.*”
>
> *Thomas Bouchard (1981)*

One month later, the brothers became the first of many separated twin pairs tested by University of Minnesota psychologist Thomas Bouchard and his colleagues (Miller, 2012c). The brothers' voice intonations and inflections were so similar that, hearing a playback of an earlier interview, Jim Springer guessed, “That's me.” Wrong—it was Jim Lewis. Given tests measuring their personality, intelligence, heart rate, and brain waves, the Jim twins—despite 38 years of separation—were virtually as alike as the same person tested twice. Both married women named Dorothy Jane Scheckelburger. Okay, the last item is a joke. But as Judith Rich Harris (2006) has noted, it is hardly weirder than some other reported similarities.

FYI

Bouchard’s famous twin research was, appropriately enough, conducted in Minneapolis, the “Twin City” (with St. Paul), and home to the Minnesota Twins baseball team.

Aided by media publicity, Bouchard (2009) and his colleagues located and studied 74 pairs of identical twins raised apart. They continued to find similarities not only of tastes and physical attributes but also of personality (characteristic patterns of thinking, feeling, and acting), abilities, attitudes, interests, and even fears.

Mona Friis Bertheussen/Moment Film

Identical twins are people two Since identical twin sisters Mia (left) and Alexandra (right), featured in the 2013 film *Twin Sisters*, were adopted to different families as infants, they have nearly always been worlds apart. The film shows Mia growing up in suburban California, Alexandra in a Norwegian village; Mia playing the piano and enjoying golf, Alexandra roaming the countryside and playing with her pet mouse. The twins share striking similarities (among them: a dislike of tomatoes, olives, and messy rooms, but a passion for chocolate).

In Sweden, researchers identified 99 separated identical twin pairs and more than 200 separated fraternal twin pairs (Pedersen et al., 1988). Compared with equivalent samples of identical twins raised together, the separated identical twins had somewhat less identical personalities. Still, separated twins were more alike if genetically identical than if fraternal. And separation shortly after birth (rather than, say, at age 8) did not amplify their personality differences.

Stories of startling twin similarities have not impressed critics, who remind us that “the plural of *anecdote* is not *data*.” They note that if any two strangers were to spend hours comparing their behaviors and life histories, they would probably discover many coincidental similarities. If researchers created a control group of biologically unrelated pairs of the same age, sex, and ethnicity, who had not grown up together but who were as similar to one another in economic and cultural background as are many of the separated twin pairs, wouldn’t these pairs also exhibit striking similarities (Joseph, 2001)? Twin researchers have replied that separated fraternal twins do not exhibit similarities comparable to those of separated identical twins.

Even the impressive data from personality assessments are clouded by the reunion of many of the separated twins some years before they were tested. Adoption agencies also tend to place separated twins in similar homes. Despite these criticisms, the striking twin-study results helped shift scientific thinking toward a greater appreciation of genetic influences.

Biological Versus Adoptive Relatives

For behavior geneticists, nature’s second real-life experiment—adoption—creates two groups: *genetic relatives* (biological parents and siblings) and *environmental relatives* (adoptive parents and siblings). For personality or any other given trait, we can therefore ask whether adopted children are more like their biological parents, who contributed their genes, or their adoptive parents, who contribute a home environment. And while sharing that home environment, do adopted siblings come to share traits?

> “*We carry to our graves the essence of the zygote that was first us.*”
>
> *Mary Pipher,* Seeking Peace: Chronicles of the Worst Buddhist in the World, *2009*

The stunning finding from studies of hundreds of adoptive families is that, apart from identical twins, people who grow up together, whether biologically related or not, do not much resemble one another in personality (McGue & Bouchard, 1998; Plomin, 2011; Rowe, 1990). In personality traits such as extraversion and agreeableness, people who have been adopted are more similar to their *biological* parents than their caregiving adoptive parents.

FYI

Coincidences are not unique to twins. Patricia Kern of Colorado was born March 13, 1941, and named Patricia Ann Campbell. Patricia DiBiasi of Oregon also was born March 13, 1941, and named Patricia Ann Campbell. Both had fathers named Robert, worked as bookkeepers, and at the time of this comparison had children ages 21 and 19. Both studied cosmetology, enjoyed oil painting as a hobby, and married military men, within 11 days of each other. They are not genetically related. (From an AP report, May 2, 1983.)

The finding is important enough to bear repeating: *The environment shared by a family's children has virtually no discernible impact on their personalities.* Two adopted children raised in the same home are no more likely to share personality traits with each other than with the child down the block.

Heredity shapes other primates' personalities, too. Macaque monkeys raised by foster mothers exhibited social behaviors that resemble their biological, rather than foster, mothers (Maestripieri, 2003). Add in the similarity of identical twins, whether raised together or apart, and the effect of a shared raising environment seems shockingly modest.

Why are children in the same family so different? Why does shared family environment have so little effect on children's personalities? Is it because each sibling experiences unique peer influences and life events? Because sibling relationships ricochet off each other, amplifying their differences? Because siblings—despite sharing half their genes—have very different combinations of genes and may evoke very different kinds of parenting? Such questions fuel behavior geneticists' curiosity.

The genetic leash may limit the family environment's influence on personality, but it does not mean that adoptive parenting is a fruitless venture. As an adoptive parent, I [ND] especially find it heartening to know that parents do influence their children's attitudes, values, manners, politics, and faith (Kandler & Riemann, 2013). This was dramatically illustrated by separated identical twins Jack Yufe, raised a Jew, and Oskar Stöhr, a member of Germany's Hitler Youth. After later reuniting, Oskar mused to Jack: "If we had been switched, I would have been the Jew, and you would have been the Nazi" (Segal, 2005, p. 70). Parenting—and the cultural environments in which parents place children—matters!

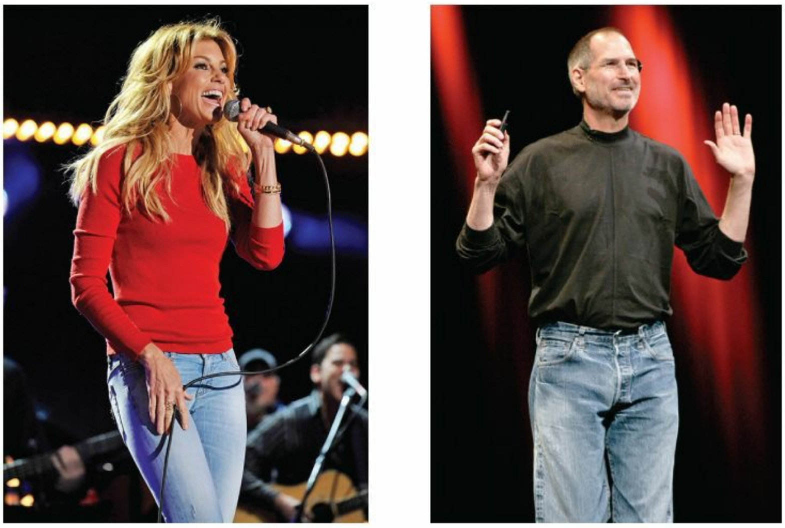
FYI

Siblings so different: Hermann Goering was outgoing, loved crowds, and became Hitler's right-hand man and founder of the Nazi Gestapo. His younger brother Albert Goering was quiet and reclusive, and worked to save Jews that brother Hermann's regime was killing (Brennan, 2010).

Tony O'Brien/REUTERS/Alamy

Nature or nurture or both? When talent runs in families, as with the Williams sisters for tennis, how do heredity and environment together do their work?

Moreover, child neglect and abuse and even parental divorce are rare in adoptive homes. Adoptive parents are carefully screened; biological parents are not. So it is not surprising that, despite a somewhat greater risk of psychological disorder, most adopted children thrive, especially when adopted as infants (Loehlin et al., 2007; van IJzendoorn & Juffer, 2006; Wierzbicki, 1993). Seven in eight adopted children have reported feeling strongly attached to one or both adoptive parents. As children of self-giving parents, they have grown up to be more self-giving and altruistic than average (Sharma et al., 1998). Many scored higher than their biological parents and raised-apart biological siblings on intelligence tests, and most grew into happier and more stable adults (Kendler et al., 2015b; van IJzendoorn et al., 2005). In one Swedish study, children adopted as infants grew up with fewer problems than were experienced by children whose biological mothers initially registered them for adoption but then decided to raise the children themselves (Bohman & Sigvardsson, 1990). *The bottom line:* Regardless of personality differences between adoptive family members, most adopted children benefit from adoption.



Left: Frederick Breedon IV/Getty Images, Right: Ryan Anson/Bloomberg/Hetty Images

Adoption matters As country music singer Faith Hill and late Apple founder Steve Jobs experienced, children benefit from one of the biggest gifts of love: adoption.

✓ Check Your Understanding

Ask Yourself

- Do you know any biological siblings who, despite having been raised in the same home, have very different personalities? (Are *you* one of these siblings, perhaps?) Knowing what you do of their lives and upbringings, what do you think contributed to these differences?

Test Yourself

- How do researchers use twin and adoption studies to learn about psychological principles?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Heritability

14-3 What is *heritability*, and how does it relate to individuals and groups?

▶ **Flip It Video: Heritability**

So our biology helps form our personality. Yet asking whether our personality is more a product of our genes or our environment is like asking whether a playing field's size is more the result of its length or its width. We could, however, ask whether the different playing-field sizes are more the result of *differences* in their length or differences in their width. Similarly, we can ask whether person-to-person personality differences are influenced more by nature or by nurture.

Using twin and adoption studies, behavior geneticists can mathematically estimate the **heritability** of a trait—the extent to which variation among individuals in a group can be attributed to their differing genes. For many personality traits, heritability is about 40 percent; for general intelligence, heritability has been estimated at about 66 percent (Haworth et al., 2010; Turkheimer et al., 2014). As Modules 63 and 64 will emphasize, this does *not* mean that *your* intelligence is 66 percent genetic. Rather, it means that genetic influence explains about 66 percent of the observed *variation among people*. We can never say what percentage of an *individual's* personality or intelligence is inherited. It makes *no* sense to say that your personality is due *x* percent to your heredity and *y* percent to your environment. This point is so often misunderstood that we repeat: Heritability refers to how much *differences among people* are due to genes.

heritability

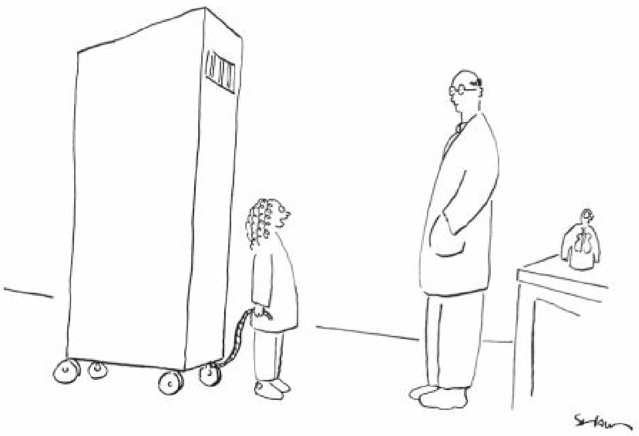
the proportion of variation among individuals in a group that we can attribute to genes. The heritability of a trait may vary, depending on the range of populations and environments studied.

The heritability of intelligence varies from study to study. Consider humorist Mark Twain's (1835–1910) fictional idea of raising boys in barrels to age 12, feeding them through a hole. If we were to follow his suggestion, the boys would all emerge with lower-than-normal intelligence scores at age 12. Yet, given their equal environments, their test score differences could be explained only by their heredity. With the same environment, heritability—differences due to genes—would be near 100 percent.

AP$^{®}$ EXAM TIP

Heritability is an important but challenging concept. The key thing to remember is that heritability refers to variation within a group. It does not refer to the impact of nature on an individual. Be clear on both what it is and what it isn't.

As environments become more similar, heredity becomes the primary source of differences. If all schools were of uniform quality, all families equally loving, and all neighborhoods equally healthy, then heritability would *increase* (because differences due to environment would *decrease*). But consider the other extreme: If all people had similar heredities but were raised in drastically different environments (some in barrels, some in luxury homes), heritability would be much lower.



The New Yorker Collection, 2003, Michael Shaw from cartoonbank .com. All Rights Reserved.

"The title of my science project is 'My Little Brother: Nature or

Nurture.’”

If genetic influences help explain variations in traits among individuals in a group, can the same be said of trait differences *between* groups? Not necessarily. Height is 90 percent heritable, yet nutrition (an environmental factor) rather than genes explains why, as a group, today’s adults have grown (Floud et al., 2011). In 1850, the average American male stood 5 feet 7 inches (170 centimeters); in the 1980s, his counterpart stood 3 inches (7.5 centimeters) taller. The two groups differ, but not because human genes have changed in this eyeblink of time. Today’s South Koreans, with their better diets, average 6 inches (15 centimeters) taller than today’s genetically similar North Koreans (Johnson et al., 2009). Genes matter, but so does environment.

As with height and weight, so with personality and intelligence scores: Heritable individual differences need not imply heritable group differences. If some *individuals* are genetically disposed to be more aggressive than others, that needn’t explain why some *groups* are more aggressive than others. Putting people in a new social context can change their aggressiveness. Today’s peaceful Scandinavians carry many genes inherited from their Viking warrior ancestors.

✓ Check Your Understanding

Ask Yourself

- As noted in this section, *heritability* can be a tricky concept. Before reading this material, how would you have interpreted the statement “Height is 90 percent heritable”? How would you explain this statement now?

Test Yourself

- Those studying the *heritability* of a trait try to determine how much of the person-to-person variation in that trait among members of a specific group is due to their differing _______________.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Gene-Environment Interaction

14-4 How is molecular genetics research changing our understanding of the effects of nature and nurture?

Among our similarities, the most important—the behavioral hallmark of our species—is our enormous adaptive capacity. Some human traits develop the same in virtually every environment. But other traits are expressed only in particular environments. Go barefoot for a summer and you will develop toughened, callused feet—a biological adaptation to friction. Meanwhile, your shod neighbor will remain a tenderfoot. The difference between the two of you is an effect of environment. But it is also the product of a biological mechanism—adaptation. Our shared biology enables our developed diversity (Buss, 1991). Thus, to say that genes and experience are *both* important is true. But more precisely, they **interact**. Just *how* our genes and our experiences interact to form us as unique individuals is one of the hottest topics in psychology today. Gene-environment interaction studies are revealing, for example, who is most at risk of permanent harm from stress or abuse and who is most likely to benefit from interventions (Manuck & McCaffery, 2014).

interaction

the interplay that occurs when the effect of one factor (such as environment) depends on another factor (such as heredity).

> “*Men’s natures are alike; it is their habits that carry them far apart.*”
>
> *Confucius, Analects, 500* B.C.E.

> “*Heredity deals the cards; environment plays the hand.*”
>
> *Psychologist Charles L. Brewer (1990)*

Molecular Behavior Genetics

Behavior geneticists have progressed beyond asking “Do genes influence behavior?” The newest frontier of behavior-genetic research draws on “bottom-up” **molecular genetics**, which studies the molecular structure and function of genes.

molecular genetics

the subfield of biology that studies the molecular structure and function of genes.

Searching for Specific Genes Influencing Behavior

Most human traits are influenced by teams of genes. For example, twin and adoption studies tell us that heredity influences body weight, but there is no single “obesity gene.” Some genes influence how quickly the stomach tells the brain, “I’m full” (Adetunji, 2014). Others might dictate how much fuel the muscles need, how many calories are burned off by fidgeting, and how efficiently the body converts extra calories into fat (Vogel, 1999). Genes typically are not solo players. So, one goal of **molecular behavior genetics** is to find some of the many genes that together orchestrate complex traits such as body weight, sexual orientation, and impulsivity.

molecular behavior genetics

the study of how the structure and function of genes interact with our environment to influence behavior.

Epigenetics: Triggers That Switch Genes On and Off

Genes can be either active (expressed, as in the example of hot water activating a tea bag) or inactive. **Epigenetics** (meaning “in addition to” or “above and beyond” genetics), studies the molecular mechanisms by which environments can trigger or block genetic expression. Genes are *self-regulating.* Rather than acting as blueprints that lead to the same result no matter the context, genes react. An African butterfly that is green in summer turns brown in fall, thanks to a temperature-controlled genetic switch. The same genes that produced green in one situation will produce brown in another.

epigenetics
"above" or "in addition to" *(epi)* genetics; the study of environmental influences on gene expression that occur without a DNA change.

Bobby Metelus/Getty Images

Gene-environment interaction Biological appearances have environmental consequences. Basketball star Lebron James (right) looked like a basketball player from an early age, and those around him probably encouraged his interest and hard work in the sport. For popular comedian Kevin Hart (left), his shorter stature meant that he was less likely to be encouraged toward basketball, but his clever style and winning smile were rewarded on the comedy stage.

Our experiences also create *epigenetic marks,* which are often organic methyl molecules attached to part of a DNA strand. If a mark instructs the cell to ignore any gene present in that DNA segment, those genes will be "turned off"—they will prevent the DNA from producing the proteins normally coded by that gene (Figure 14.3). As one geneticist explained, "Things written in pen you can't change. That's DNA. Things written in pencil you can. That’s epigenetics” (Reed, 2012).

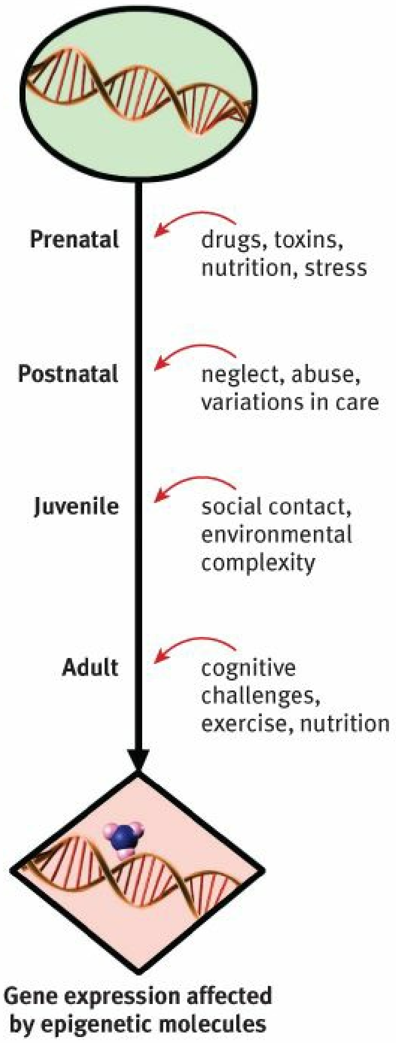

Prenatal
drugs, toxins, nutrition, stress
Postnatal
neglect, abuse, variations in care
Juvenile
social contact, environmental complexity
Adult
cognitive challenges, exercise, nutrition
Gene expression affected by epigenetic molecules

Figure 14.3
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Research from Champagne, 2010.

Figure 14.3 Epigenetics influences gene expression

Beginning in the womb, life experiences lay down *epigenetic marks* —often organic methyl molecules—that can affect the expression of any gene in the DNA segment they affect.

Environmental factors such as diet, drugs, and stress can affect the epigenetic molecules that regulate gene expression. Mother rats normally lick their infants. Deprived of this licking in experiments, infant rats had more epigenetic molecules blocking access to their brain’s “on” switch for developing stress hormone receptors. When stressed, those animals had above-average levels of free-floating stress hormones and were more reactive (Champagne et al., 2003; Champagne & Mashoodh, 2009).

Epigenetics provides a mechanism by which the effects of childhood trauma, poverty, or malnutrition may last a lifetime (Nugent et al., 2016; Peter et al., 2016; Swartz et al., 2016). Our life events can mark us at the deepest level. Child abuse may leave its fingerprints in a person’s genome. Moreover, it now appears that some epigenetic changes are passed down to future generations. In one experiment, mice whose grandparents learned to associate the smell of orange blossoms with electric shock were themselves startled when first exposed to the scent (Dias & Ressler, 2014). Conceivably, your health and well-being could be affected by stresses or pollutants that your parent or even grandparent experienced (McCarrey, 2015; Skinner, 2014; Yehuda et al., 2016). In one study, Holocaust trauma survivors shared epigenetic alterations with their offspring (Yehuda et al., 2016).

Epigenetics research may solve some scientific mysteries, such as why only one member of an identical twin pair may develop a genetically influenced mental disorder (Spector, 2012). Epigenetics can also help explain why identical twins may look slightly different. Researchers studying mice have found that in utero exposure to certain chemicals can cause genetically identical twins to have different-colored fur (Dolinoy et al., 2007).

✓ Check Your Understanding

Ask Yourself

- Imagine that prenatal genetic testing could eventually predict the likelihood of certain complex traits, such as body weight or sexual orientation. What would be the benefits and drawbacks of such testing? If such tests had been available when you were in the womb, would you want them to have been conducted?

Test Yourself

- Match the following terms to the correct explanation.

1. Epigenetics
2. Molecular behavior genetics
3. Behavior genetics

a. Study of the relative effects of our genes and our environment on our behavior.

b. Study of how the structure and function of specific genes interact with our environment to influence behavior.

c. Study of environmental factors that affect how our genes are *expressed.*

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 14 REVIEW

14-1 What are *chromosomes, DNA, genes,* and the human *genome*? How do behavior geneticists explain our individual differences?

- *Genes* are the biochemical units of heredity that make up *chromosomes,* the threadlike coils of *DNA.*
- When genes are “turned on” (expressed), they provide the code for creating the proteins that form our body’s building blocks.
- Most human traits are influenced by many genes acting together.
- *Behavior geneticists* seek to quantify genetic and *environmental* influences on our traits. Most of our differing traits are influenced by not one gene, but many, and by the interaction of our individual environments with these genetic predispositions.

14-2 How do twin and adoption studies help us understand the effects and interactions of nature and nurture?

- Studies of *identical* (monozygotic) *twins, fraternal* (dizygotic) *twins,* and adoptive families allow researchers to consider the effects of shared environment and shared genes, which sheds light on how nature and nurture influence our traits.
- Shared family environments have little effect on personality, and the stability of personality suggests a genetic predisposition.

14-3 What is *heritability,* and how does it relate to individuals and groups?

- *Heritability* describes the extent to which variation among members of a group can be attributed to genes.
- Heritable individual differences (in traits such as height or intelligence) do not necessarily imply heritable group differences. Genes mostly

explain why some people are taller than others, but not why people are taller today than they were a century ago.

14-4 How is molecular genetics research changing our understanding of the effects of nature and nurture?

- Our genetic predispositions and our surrounding environments *interact.* Environments can trigger gene activity, and genetically influenced traits can evoke responses from others.
- *Molecular geneticists* study the molecular structure and function of genes, including those that affect behavior.
- Psychologists and molecular geneticists are cooperating to identify specific genes—or more often, teams of genes—that put people at risk for disorders.
- The field of *epigenetics* studies the influences on gene expression that occur without changes in DNA.

Multiple-Choice Questions

1. Human genome (DNA) researchers have discovered that

a. chimpanzees are completely different than humans, sharing a small DNA sequence percentage.
b. the occasional variations found at particular gene sites in human DNA are of no interest to science.
c. complex behaviors are determined by specific individual genes.
d. human genes are mostly the same, regardless of race.
e. genetic predispositions do not help explain our shared human nature and our human diversity.

2. Which of the following will be the most alike?

a. Fraternal twins raised in the same environment.
b. Identical twins raised in different environments.
c. Siblings raised in the same environment.
d. Fraternal twins raised in different environments.

    e. Identical twins raised in the same environment.

3. Generally speaking, heritability is the extent to which

    a. differences among people are accounted for by genes.
    b. an individual’s specific traits are due to genes or the environment.
    c. differences among people are due to the environment.
    d. differences among people are due to their cultural heritage.
    e. an individual’s height is related to the height of his or her parents.

4. Epigenetics might best explain which of the following?

    a. Tobi and Natalie are fraternal twins; both have the same IQ score.
    b. Nico and Kris, two siblings, have the same shoe size.
    c. Lisa and Eloisa are identical twins; only one develops schizophrenia.
    d. Tom and Ken are identical twins; both develop schizophrenia.
    e. Patrick and Patricia, two siblings, have very different levels of musical talent.

5. Which of the following is an example of gene-environment interaction?

    a. Yeh Lin experiences flushing syndrome, which mostly occurs in people of Asian heritage.
    b. Alfonso gets food poisoning from eating undercooked meat.
    c. Ted gets diabetes, which runs in his family, because he eats too much sugary food.
    d. Samantha has a food allergy to shellfish.
    e. Jordan has an autoimmune disorder that causes him to lose hair.

Practice FRQs

1. Provide two examples of how nature and nurture interact to affect an individual’s physical health.

Answer

1 point: Because nature refers to the contributions of heredity, a person may be predisposed to develop (or not) diabetes or heart disease.

Page 129

1 point: Because nurture refers to the contributions of environment and the way individuals are raised, an individual may eat a balanced diet and exercise regularly, activities that will make them healthy, which may counteract their heredity. ↩ Page 129

2. What does it mean to say that the heritability of height is 90 percent? What does that tell us about the contribution of genetics to any one person’s height?

(2 points)

Module **15 Evolutionary Psychology: Understanding Human Nature**

LEARNING TARGETS

- 15-1 Describe evolutionary psychologists’ use of natural selection to explain behavior tendencies.
- 15-2 Discuss evolutionary explanations for male-female differences in sexuality and mating preferences.
- 15-3 Explain the key criticisms of evolutionary explanations of human sexuality, and discuss how evolutionary psychologists respond.
- 15-4 Describe the biopsychosocial approach to development.

15-1 How do evolutionary psychologists use natural selection to explain behavior tendencies?

Behavior geneticists explore the genetic and environmental roots of human differences. **Evolutionary psychologists** instead focus mostly on what makes us so much alike as humans. They use Charles Darwin’s principle of **natural selection**—“arguably the most momentous idea ever to occur to a human mind,” said Richard Dawkins (2007)—to understand the roots of behavior and mental processes. The idea, simplified, is this:

- Organisms’ varied offspring compete for survival.
- Certain biological and behavioral variations increase organisms’

reproductive and survival chances in their particular environment.

- Offspring that survive are more likely to pass their genes to ensuing generations.
- Thus, over time, population characteristics may change.

evolutionary psychology

the study of the evolution of behavior and the mind, using principles of natural selection.

natural selection

the principle that inherited traits that better enable an organism to survive and reproduce in a particular environment will (in competition with other trait variations) most likely be passed on to succeeding generations.

To see these principles at work, let’s consider a straightforward example in foxes.

Natural Selection and Adaptation

A fox is a wild and wary animal. If you capture a fox and try to befriend it, be careful: If the timid fox cannot flee, it may snack on your fingers. Russian scientist Dmitry Belyaev wondered how our human ancestors had domesticated dogs from their equally wild wolf forebears. Might he, within a comparatively short stretch of time, accomplish a similar feat by transforming the fearful fox into a friendly fox?

To find out, Belyaev set to work with 30 male and 100 female foxes. From their offspring he selected and mated the tamest 5 percent of males and 20 percent of females. (He measured tameness by the foxes' responses to attempts to feed, handle, and stroke them.) Over more than 30 generations of foxes, Belyaev and his successor, Lyudmila Trut, repeated that simple procedure. Forty years and 45,000 foxes later, they had a new breed of foxes that, in Trut's (1999) words, were "docile, eager to please, and unmistakably domesticated. . . . Before our eyes, 'the Beast' has turned into 'beauty,' as the aggressive behavior of our herd's wild [ancestors] entirely disappeared." So friendly and eager for human contact were these animals, so inclined to whimper to attract attention and to lick people like affectionate dogs, that the cash-strapped institute seized on a way to raise funds—marketing its friendly foxes as house pets.

Eric Isselée/Shutterstock

Over time, traits that give an individual or a species a reproductive advantage are *selected* and will prevail. Animal-breeding experiments manipulate genetic selection. Dog breeders have given us sheepdogs that herd, retrievers that retrieve, trackers that track, and pointers that point (Plomin et al., 1997). Psychologists, too, have bred animals to be serene or reactive, quick learners or slow ones.

Does the same process work with naturally occurring selection? Does natural selection explain our human tendencies? Nature has indeed selected advantageous variations from the new gene combinations produced at each human conception plus the **mutations** (random errors in gene replication) that sometimes result. But the tight genetic leash that predisposes a dog's retrieving, a cat's pouncing, or a bird's nesting is looser on humans. The genes selected during our ancestral history provide more than a long leash; they give us a great capacity to learn and therefore to *adapt* to life in varied environments, from the tundra to the jungle. Genes and experience together wire the brain. Our adaptive flexibility in responding to different environments contributes to our *fitness*—our ability to survive and reproduce.

mutation

a random error in gene replication that leads to a change.

✓ Check Your Understanding

Ask Yourself

- Imagine that a mad scientist wanted to breed humans to favor particular behavioral traits. How would the scientist go about it? Why might this prove a greater challenge than breeding less complex mammals?

Test Yourself

- How are Belyaev and Trut's fox-breeding practices similar to, and how do they differ from, the way natural selection normally occurs?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Evolutionary Success Helps Explain Similarities

Human differences grab our attention. Guinness World Records entertain us with the tallest, oldest, hairiest, and most-tattooed humans. But our deep similarities also demand explanation. At the Amsterdam Airport's international arrivals area, one sees the same delighted joy on the faces of Indonesian grandmothers, Chinese children, and homecoming Dutch. Evolutionary psychologist Steven Pinker (2002, p. 73) noted that, thanks to human evolution, our shared human traits—our emotions, drives, and reasoning—"have a common logic across cultures."

Our Genetic Legacy

Our similarities arise from our shared human *genome,* our common genetic profile. No more than 5 percent of the genetic differences among humans arise from population group differences. Some 95 percent of genetic variation exists *within* populations (Rosenberg et al., 2002). The typical genetic difference between two Icelandic villagers or between two Kenyans is much greater than the *average* difference between the two groups. Thus, if after a worldwide catastrophe only Icelanders or Kenyans survived, the human species would suffer only "a trivial reduction" in its genetic diversity (Lewontin, 1982).

And how did we develop this shared human genome? At the dawn of human history, our ancestors faced certain questions: Who is my ally, who is my foe? With whom should I mate? What food should I eat? Some individuals answered those questions more successfully than others. For example, women who experienced nausea in the critical first three months of pregnancy were genetically predisposed to avoid certain bitter, strongly flavored, and novel foods. Avoiding such foods had survival value, since they are the very foods most often toxic to prenatal development (Profet, 1992; Schmitt & Pilcher, 2004). Early humans disposed to eat nourishing rather than poisonous foods survived to contribute their genes to later generations. Those who deemed leopards "nice to pet" often did not.

Similarly successful were those whose mating helped them produce and nurture offspring. Over generations, the genes of individuals not disposed to mate or nurture tended to be lost from the human gene pool. As success-enhancing genes continued to be selected, behavioral tendencies and learning capacities emerged that prepared our Stone Age ancestors to survive, reproduce, and send their genes into the future, and into you.

Across our cultural differences, we even share a “universal moral grammar” (Mikhail, 2007). Men and women, young and old, liberal and conservative, living in Sydney or Seoul, all respond negatively when asked, “If a lethal gas is leaking into a vent and is headed toward a room with seven people, is it okay to push someone into the vent—saving the seven but killing the one?” And they all respond more approvingly when asked if it’s okay to *allow* someone to fall into the vent, again sacrificing one life but saving seven. Our shared moral instincts survive from a distant past where we lived in small groups in which direct harm-doing was punished. For all such universal human tendencies, from our intense need to give parental care to our shared fears and lusts, evolutionary theory proposes a one-stop-shopping explanation (Schloss, 2009).

As inheritors of this prehistoric legacy, we are genetically predisposed to behave in ways that promoted our ancestors’ surviving and reproducing. But in some ways, we are biologically prepared for a world that no longer exists. We love the taste of sweets and fats, nutrients that prepared our physically active ancestors to survive food shortages. But few of us now hunt and gather our food; instead, we find sweets and fats in fast-food outlets and vending machines. Our natural dispositions, rooted deep in history, are mismatched with today’s junk-food nutrition and often inactive lifestyle.

FYI

Despite high infant mortality and rampant disease in past millennia, not one of your countless biological ancestors died childless.

Evolutionary Psychology Today

Darwin’s theory of evolution has become one of biology’s fundamental organizing principles and lives on in the *second Darwinian revolution:* the application of evolutionary principles to psychology. In concluding *On the Origin of Species,* Darwin (1859, p. 346) anticipated this, foreseeing “open fields for far more important researches. Psychology will be based on a new foundation.”

FYI

Those who are troubled by an apparent conflict between scientific and religious accounts of human origins may find it helpful to recall from Module 2 that different perspectives of life can be complementary. For example, the scientific account attempts to tell us *when* and *how*; religious creation stories usually aim to tell about an ultimate *who* and *why*. As Galileo explained to the Grand Duchess Christina, “The Bible teaches how to go to heaven, not how the heavens go.”

In modules to come, we’ll address questions that intrigue evolutionary psychologists: Why do infants start to fear strangers about the time they become mobile? Why do so many more people have phobias about spiders, snakes, and heights than about more dangerous threats, such as guns and electricity? And why do we fear safe air travel so much more than dangerous driving?

To see how evolutionary psychologists think and reason, let’s pause to explore their answers to two questions: How are males and females alike? How and why does their sexuality differ?

An Evolutionary Explanation of Human Sexuality

15-2 How might an evolutionary psychologist explain male-female differences in sexuality and mating preferences?

Having faced many similar challenges throughout history, males and females have adapted in similar ways: We eat the same foods, avoid the same dangers, and perceive, learn, and remember similarly. It is only in those domains where we have faced differing adaptive challenges—most obviously in behaviors related to reproduction—that we differ, say evolutionary psychologists.

Male-Female Differences in Sexuality

And differ we do. Consider sex drives. Both men and women are sexually motivated, some women more so than many men. Yet, on average, who thinks more about sex? Masturbates more often? Initiates more sex? Views more pornography? The answers worldwide: *men, men, men,* and *men* (Baumeister et al., 2001; Lippa, 2009; Petersen & Hyde, 2010). No surprise, then, that in one BBC survey of more than 200,000 people in 53 nations, men everywhere more strongly agreed that “I have a strong sex drive” and “It doesn’t take much to get me sexually excited” (Lippa, 2008).

Indeed, “with few exceptions anywhere in the world,” reported cross-cultural psychologist Marshall Segall and his colleagues (1990, p. 244), “males are more likely than females to initiate sexual activity.” This is the largest sexuality difference between males and females, but there are others (Hyde, 2005; Petersen & Hyde, 2010; Regan & Atkins, 2007). To see if you can predict some of these differences in Americans, take the quiz in **Table 15.1**.

TABLE 15.1 Predict the Responses

Researchers asked samples of U.S. adults whether they agreed or disagreed with the following statements. For each item, give your best guess about the percentage who agreed with the statement, then check your answers below.[1]

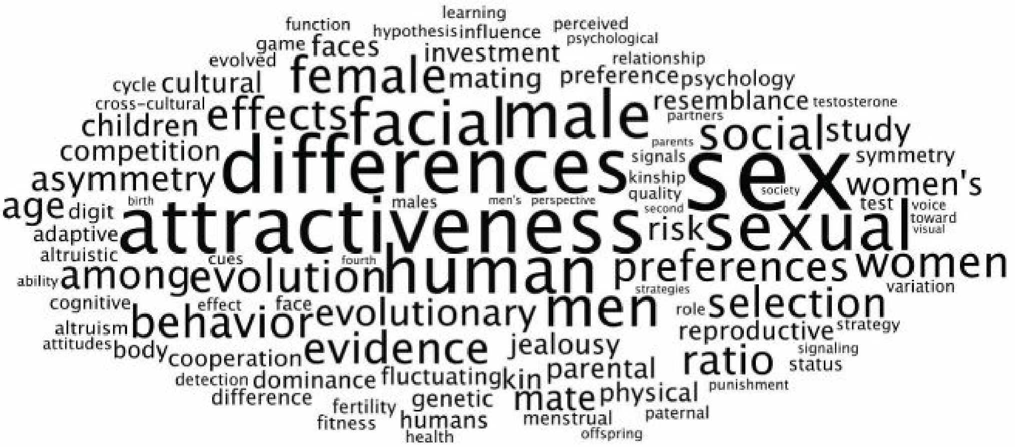
Statement	**Percentage of males who agreed**	**Percentage of females who agreed**
1. If two people really like each other, it’s all right for them to have sex even if they’ve known each other for a very short time.	__________	__________
2. I can imagine myself being comfortable and enjoying “casual” sex with different partners.	__________	__________
3. Affection was the reason I first had intercourse.	__________	__________
4. I think about sex every day, or several times a day.	__________	__________
5. Pornography is “morally acceptable.”	__________	__________

[1] Information from Bailey et al., 2000; Dugan, 2015; Laumann et al., 1994; Pryor et al., 2005.

ANSWERS: (1) males, 58 percent; females, 34 percent. (2) males, 48 percent; females, 12 percent. (3) males, 25 percent; females, 48 percent. (4) males, 54 percent; females, 19 percent. (5) males, 43 percent; females, 25 percent.

Heterosexual men are alert for women’s interest and often misperceive a woman’s friendliness as a sexual come-on (Abbey, 1987). In one speed-dating study, men believed their dating partners expressed more sexual interest than the partners reported actually expressing (Perilloux et al., 2012). This *sexual overperception bias* is strongest among men who require little emotional closeness before intercourse (Howell et al., 2012; Perilloux et al., 2012).

Many gender similarities and differences transcend sexual orientation. Compared with lesbians, gay men (like straight men) report more responsiveness to visual sexual stimuli and more concern with their partner’s physical attractiveness (Bailey et al., 1994; Doyle, 2005; Schmitt, 2007; Sprecher et al., 2013). Gay male couples also report having sex more often than do lesbian couples (Peplau & Fingerhut, 2007). And (also like straight men) gay men report more interest in uncommitted sex.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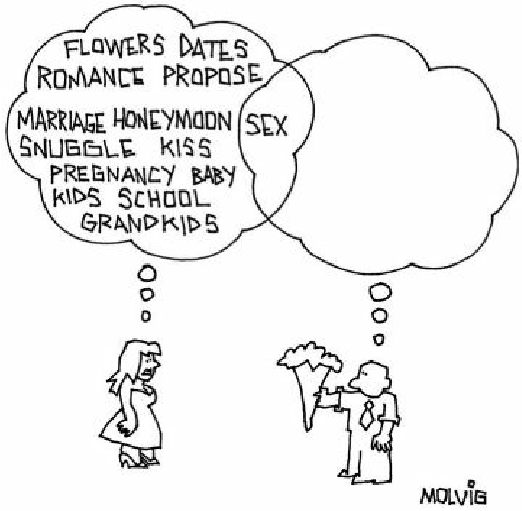
detection
dominance
fluctuating
kin
parental
punishment
difference
fertility
genetic
mate
physical
fitness
humans
menstrual
paternal
health
offspring

Webster, G. D., Jonason, P. K., & Schember, T. O. (2009). Hot topics and popular papers in evolutionary psychology. *Evolutionary Psychology*, 7(3), 348–362.

What evolutionary psychologists study Each word's size in this word cloud shows how frequently it has appeared in evolutionary psychology article titles. (Information from Gregory Webster, Peter Jonason, and Tatiana Schember [2009] from all articles published in *Evolution and Human Behavior* between 1997 and 2008.)

Natural Selection and Mating Preferences

Natural selection is nature selecting traits and appetites that contribute to survival and reproduction. Evolutionary psychologists use this principle to explain how men and women differ more in the bedroom than in the boardroom. Our natural yearnings, they say, are our genes' way of reproducing themselves. "Humans are living fossils—collections of mechanisms produced by prior selection pressures" (Buss, 1995).


FLOWERS DATES
ROMANCE PROPOSE
MARRIAGE HONEYMOON
SNUGGLE KISS
PREGNANCY BABY
KIDS SCHOOL
GRANDKIDS
SEX
MOLVIG

The New Yorker Collection, 2010, Ariel Molvig, from cartoonbank.com. All Rights Reserved.

Why do women tend to be choosier than men when selecting sexual partners? Women have more at stake. To send her genes into the future, a woman must—at a minimum—conceive and protect a fetus growing inside her body for up to nine months, and may often nurse for many months following birth. No surprise then, that heterosexual women prefer partners who will offer their joint offspring support and protection: stick-around dads over likely cads. Heterosexual women are attracted to tall men with slim waists and broad shoulders—all signs of reproductive success (Mautz et al., 2013). And they prefer men who seem mature, dominant, bold, and affluent (Conroy-Beam et al., 2015; Fales et al., 2016; Lukaszewski et al., 2016). One study of hundreds of Welsh pedestrians asked people to rate a driver pictured at the wheel of a humble Ford Fiesta or a swanky Bentley. Men said a female driver was equally attractive in both cars. Women, however, found a male driver more attractive if he was in the luxury car (Dunn & Searle, 2010).

The data are in, say evolutionists: Men pair widely; women pair wisely. And what traits do straight men find desirable? Some, such as a woman's smooth skin and youthful shape, cross place and time, and they convey health and fertility (Buss, 1994). Mating with such women might increase a man's chances of sending his genes into the future. And sure enough, men feel most attracted to women whose waist is roughly a third narrower than their hips—a sign of future fertility (Lewis et al., 2015; Perilloux et al., 2010). Even blind men show this preference for women with a low waist-to-hip ratio (Karremans et al., 2010). Men are most attracted to women whose ages in the ancestral past (when ovulation began later than today) would be associated with peak fertility (Kenrick et al., 2009). Thus, teen boys are most excited by a woman several years older than themselves, mid-twenties men prefer women around their own age, and older men prefer younger women. This pattern consistently appears across European singles ads, Indian marital ads, and marriage records from North and South America, Africa, and the Philippines (Singh, 1993; Singh & Randall, 2007).

MGP/Getty Images

There is a principle at work here, say evolutionary psychologists: Nature selects behaviors that increase genetic success. As mobile gene machines, we are designed to prefer whatever worked for our ancestors in their environments. They were genetically predisposed to act in ways that would produce children, grandchildren, and beyond. Had they not been, we wouldn't be here. As carriers of their genetic legacy, we are similarly predisposed.

Critiquing the Evolutionary Perspective

15-3 What are the key criticisms of evolutionary explanations of human sexuality, and how do evolutionary psychologists respond?

Most psychologists agree that natural selection prepares us for survival and reproduction. But critics say there is a weakness in evolutionary psychology's explanation of our mating preferences. Let's consider how an evolutionary psychologist might explain the findings in a startling study (Clark & Hatfield, 1989), and how a critic might object.

In this experiment, a college student posing as a stranger approached students of the other sex and remarked, "I have been noticing you around campus. I find you to be very attractive." The "stranger" then asked a question, which was sometimes "Would you go to bed with me tonight?"

What percentage of men and women do you think agreed? An evolutionary explanation of sexuality would predict that women would be choosier than men in selecting their sexual partners. In fact, not a single woman agreed—but 70 percent of the men did. A repeat of this study in France produced a similar result (Guéguen, 2011). The research seemed to support an evolutionary explanation.

Or did it? Critics note that evolutionary psychologists start with an effect—in this case, the survey result showing that men were more likely to accept casual sex offers—and work backward to explain what happened. What if research showed the opposite effect? If men refused an offer for casual sex, might we not reason that men who partner with one woman for life make better fathers, whose children more often survive?

Other critics ask why we should try to explain today's behavior based on decisions our distant ancestors made thousands of years ago. Don't cultural expectations also bend the genders? Alice Eagly and Wendy Wood (1999; Eagly, 2009) point to the smaller behavioral differences between men and women in cultures with greater gender equality. Such critics believe that *social learning theory* offers a better, more immediate explanation for these results. We all learn **social scripts**—our culture's guide to how people should act in certain situations. By watching and imitating others in their culture, women may learn that sexual encounters with strangers can be dangerous, and that casual sex may not offer much sexual pleasure (Conley, 2011). This alternative explanation of the study's effects proposes that women react to sexual encounters in ways that their modern culture teaches them. And men's reactions may reflect their learned social scripts: "Real men" take advantage of every opportunity to have sex.

social script

a culturally modeled guide for how to act in various situations.

A third criticism focuses on the social consequences of accepting an evolutionary explanation. Are heterosexual men truly hardwired to have sex with any woman who approaches them? If so, does it mean that men have no moral responsibility to remain faithful to their partners? Does this explanation excuse men’s sexual aggression—“boys will be boys”—because of our evolutionary history?

Evolutionary psychologists agree that much of who we are is *not* hardwired. “Evolution forcefully rejects a genetic determinism,” insisted one research team (Confer et al., 2010). Genes are not destiny. And evolutionary psychologists remind us that men and women, having faced similar adaptive problems, are far more alike than different. Natural selection has prepared us to be flexible. We humans have a great capacity for learning and social progress. We adjust and respond to varied environments. We adapt and survive, whether we live in the Arctic or the desert.

> “*It is dangerous to show a man too clearly how much he resembles the beast, without at the same time showing him his greatness. It is also dangerous to allow him too clear a vision of his greatness without his baseness. It is even more dangerous to leave him in ignorance of both.*”
>
> *Blaise Pascal*, Pensées, *1659*

Evolutionary psychologists also agree with their critics that some traits and behaviors, such as suicide, are hard to explain in terms of natural selection (Barash, 2012; Confer et al., 2010). But they ask us to remember evolutionary psychology’s scientific goal: to explain behaviors and mental traits by offering testable predictions using principles of natural selection. We may, for example, predict that people are more likely to perform favors for those who share their genes or can later return those favors. Is this true? (The answer is *Yes*.) And evolutionary psychologists remind us that studying how we *came to be* need not dictate how we *ought to be*. Understanding our tendencies can help us overcome them.

✓ Check Your Understanding

Ask Yourself

- Whose reasoning do you find most persuasive—that of evolutionary psychologists or their critics? Why?

Test Yourself

- How do evolutionary psychologists explain male-female differences in sexuality?
- What are the three main criticisms of the evolutionary explanation of human sexuality?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Reflections on Nature, Nurture, and Their Interaction

15-4 What is included in the biopsychosocial approach to development?

“There are trivial truths and great truths,” reflected the physicist Niels Bohr on the paradoxes of science. “The opposite of a trivial truth is plainly false. The opposite of a great truth is also true.” Our ancestral history helped form us as a species. Where there is variation, natural selection, and heredity, there will be evolution. The unique gene combination created when our mother’s egg engulfed our father’s sperm predisposed both our shared humanity and our individual differences. Our genes form us. This is a great truth about human nature.

San Diego Museum of Man, photograph by Rose Tyson

Culture matters As this exhibit at San Diego’s Museum of Man illustrates, children learn their culture. A baby’s foot can step into any culture.

But our experiences also shape us. Our families and peer relationships teach us how to think and act. Differences initiated by our nature may be amplified by our nurture. If their genes and hormones predispose males to be more physically aggressive than females, culture can amplify this gender difference through norms that reward macho men and gentle women. If men are encouraged toward roles that demand physical power, and women toward more nurturing roles, each may act accordingly. Roles remake their players. Presidents in time become more presidential, servants more servile. Gender roles similarly shape us.

In many modern cultures, gender roles are merging. Brute strength has become less important for power and status (think "philanthrocapitalists" Priscilla Chan and Mark Zuckerberg). From 1965 to 2013, women soared from 9 percent to 47 percent of U.S. medical students (AAMC, 2014). In 1965, U.S. married women devoted eight times as many hours to housework as did their husbands; by 2012, this gap had shrunk to less than twice as many (Parker & Wang, 2013; Sayer, 2016). Such swift changes signal that biology does not fix gender roles.

* * *

If nature and nurture jointly form us, are we "nothing but" the product of nature and nurture? Are we rigidly determined?

We *are* the product of nature and nurture, but we are also an open system, as suggested by the biopsychosocial approach (**Figure 15.1**; see Module 2). Genes are all-pervasive but not all-powerful. People may reject their evolutionary role as transmitters of genes and choose not to reproduce. Culture, too, is all-pervasive but not all-powerful. People may defy peer pressures and resist social expectations.

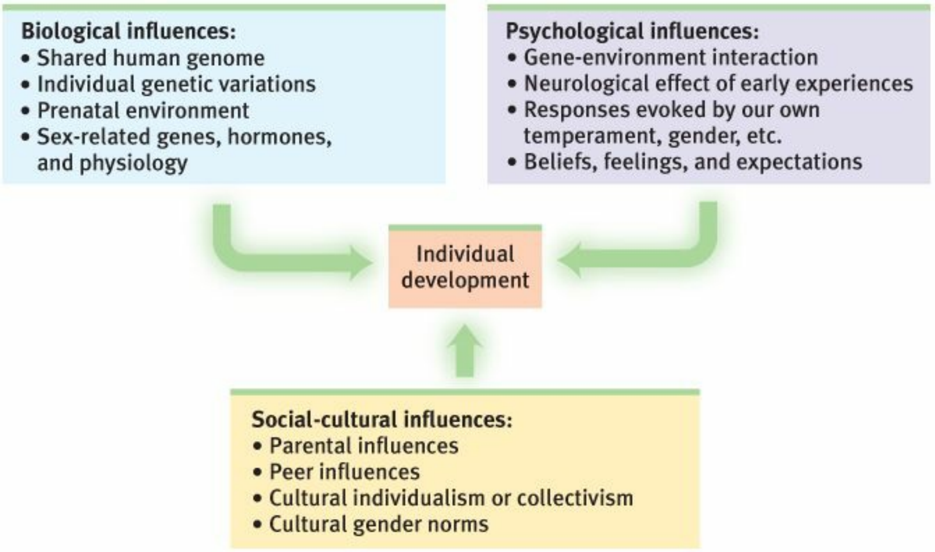

Biological influences:
• Shared human genome
• Individual genetic variations
• Prenatal environment
• Sex-related genes, hormones, and physiology
Psychological influences:
• Gene-environment interaction
• Neurological effect of early experiences
• Responses evoked by our own temperament, gender, etc.
• Beliefs, feelings, and expectations
Individual development
Social-cultural influences:
• Parental influences
• Peer influences
• Cultural individualism or collectivism
• Cultural gender norms

Figure 15.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 15.1 The biopsychosocial approach to development

Moreover, we cannot excuse our failings by blaming them solely on bad genes or bad influences. In reality, we are both creatures and creators of our worlds. So many things about us—including our gender identities and our mating behaviors—are the products of our genes and environments. Yet the stream that runs into the future flows through our present choices. Our decisions today design our environments tomorrow. The human environment is not like the weather—something that just happens. We are its architects. Our hopes, goals, and expectations influence our destiny. And that is what enables cultures to vary and to change. Mind matters.

* * *

We know from our correspondence and from surveys that some readers are troubled by the naturalism and evolutionism of contemporary science. "The idea that human minds are the product of evolution is . . . unassailable fact," declared a 2007 editorial in *Nature*, a leading science journal. In *The Language of God*, Human Genome Project director Francis Collins (2006, pp. 141, 146), a self-described evangelical Christian, compiled the "utterly compelling" evidence that led him to conclude that Darwin's big idea is "unquestionably correct." Yet Gallup pollsters have reported that 42 percent of U.S. adults believe that humans were created "pretty much in their present form" within the last 10,000 years (Newport, 2014). Many people who dispute the scientific story worry that a science of behavior (and evolutionary science in particular) will destroy our sense of the beauty, mystery, and spiritual significance of the human creature. For those concerned, we offer some reassuring thoughts.

> “*Let's hope that it's not true; but if it is true, let's hope that it doesn't become widely known.*”
>
> *Lady Ashley, commenting on Darwin's theory*

When Isaac Newton explained the rainbow in terms of light of differing wavelengths, the British poet John Keats feared that Newton had destroyed the rainbow’s mysterious beauty. Yet, as evolutionary biologist Richard Dawkins (1998) noted in *Unweaving the Rainbow*, Newton’s analysis led to an even deeper mystery—Einstein’s theory of special relativity. Nothing about Newton’s optics need diminish our appreciation for the dramatic elegance of a rainbow arching across a brightening sky.

> “*Is it not stirring to understand how the world actually works—that white light is made of colors, that color measures light waves, that transparent air reflects light . . . ? It does no harm to the romance of the sunset to know a little about it.*”
>
> *Carl Sagan,* Skies of Other Worlds, *1988*

When Galileo assembled evidence that the Earth revolved around the Sun, not vice versa, he did not offer irrefutable proof for his theory. Rather, he offered a coherent explanation for a variety of observations, such as the changing shadows cast by the Moon’s mountains. His explanation eventually won the day because it described and explained things in a way that made sense, that hung together. Darwin’s theory of evolution likewise is a coherent view of natural history. It offers an organizing principle that unifies various observations.

Many people of faith find the scientific idea of human origins congenial with their spirituality. In the fifth century, St. Augustine (quoted by Wilford, 1999) wrote, “The universe was brought into being in a less than fully formed state, but was gifted with the capacity to transform itself from unformed matter into a truly marvelous array of structures and life forms.” Some 1600 years later, Pope Francis in 2014 welcomed a science-religion dialogue, saying, “Evolution in nature is not inconsistent with the notion of creation, because evolution requires the creation of beings that evolve.”

Meanwhile, many people of science are awestruck at the emerging understanding of the universe and the human creature. It boggles the mind—the entire universe popping out of a point some 14 billion years ago, and instantly inflating to cosmological size. Had the energy of this Big Bang been the tiniest bit less, the universe would have collapsed back on itself.

Had it been the tiniest bit more, the result would have been a soup too thin to support life. Astronomer Sir Martin Rees has described *Just Six Numbers* (1999), any one of which, if changed ever so slightly, would produce a cosmos in which life could not exist. Had gravity been a tad stronger or weaker, or had the weight of a carbon proton been a wee bit different, our universe just wouldn't have worked.

heromen30/Shutterstock

What caused this almost-too-good-to-be-true, finely tuned universe? Why is there something rather than nothing? How did it come to be, in the words of Harvard-Smithsonian astrophysicist Owen Gingerich (1999), "so extraordinarily right, that it seemed the universe had been expressly designed to produce intelligent, sentient beings"? On such matters, a humble, awed, scientific silence is appropriate, suggested philosopher Ludwig Wittgenstein: "Whereof one cannot speak, thereof one must be silent" (1922, p. 189).

Rather than fearing science, we can welcome its enlarging our understanding and awakening our sense of awe. In *The Fragile Species,* Lewis Thomas (1992) described his utter amazement that the Earth in time gave rise to bacteria and eventually to Bach's Mass in B Minor. In a short 4 billion years, life on Earth has come from nothing to structures as complex as a 6-billion-unit strand of DNA and the incomprehensible intricacy of the human brain. Atoms no different from those in a rock somehow formed dynamic entities that produced extraordinary, self-replicating, information-processing systems—us (Davies, 2007). Although we appear to have been created from dust, over eons of time, the end result is a priceless creature, one rich with potential beyond our imagining.

> “ *The causes of life’s history [cannot] resolve the riddle of life’s meaning.* ”
>
> *Stephen Jay Gould*, Rocks of Ages: Science and Religion in the Fullness of Life, *1999*

✓ Check Your Understanding

Ask Yourself

- How have your heredity and your environment influenced who you are today? Can you recall an important time when you determined your own fate in a way that was at odds with pressure you felt from either your heredity or your environment?

Test Yourself

- How does the biopsychosocial approach explain our individual development?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

* * *

In this unit we have glimpsed an overriding principle: Everything psychological is simultaneously biological. We have focused on how our thoughts, feelings, and actions arise from our specialized yet integrated and wondrously adaptable brain. In modules to come, we will further explore the significance of the biological revolution in psychology.

From nineteenth-century phrenology to today’s neuroscience, we have come a long way. Yet what is unknown still dwarfs what is known. We can describe the brain. We can learn the functions of its parts. We can study how the parts communicate. But how do we get mind out of meat? How does the electrochemical whir in a hunk of tissue the size of a small cabbage give rise to elation, a creative idea, or that memory of Grandmother?

Much as gas and air can give rise to something different—fire—so also, believed Roger Sperry, does the complex human brain give rise to something different: *consciousness*. The mind, he argued, emerges from the brain's dance of ions, yet is not reducible to it. As neuroscientist Donald MacKay (1978) observed, "[My brain activity] reflects what I am thinking, as [computer] activity reflects the equation it is solving." The mind and brain activities are yoked, he noted, but are complementary and conceptually distinct.

> "*All psychological phenomena are caused by the brain, but many are better understood at the level of the mind.*"
>
> *Tweet from psychologist Steven Pinker, June 10, 2013*

Cells cannot be fully explained by the actions of atoms, nor minds by the activity of cells. Psychology is rooted in biology, which is rooted in chemistry, which is rooted in physics. Yet psychology is more than applied physics. As Jerome Kagan (1998) reminded us, the meaning of the Gettysburg Address is not reducible to neural activity. Communication is more than air flowing over our vocal cords. Morality and responsibility become possible when we understand the mind as a "holistic system," said Sperry (1992). We are not mere jabbering robots. Brains make thoughts. And thoughts change brains.

The mind seeking to understand the brain—that is indeed among the ultimate scientific challenges. And so it will always be. To paraphrase cosmologist John Barrow, a brain simple enough to be fully understood is too simple to produce a mind able to understand it.

Module 15 REVIEW

15-1 How do evolutionary psychologists use natural selection to explain behavior tendencies?

- *Evolutionary psychologists* seek to understand how our traits and behavior tendencies are shaped by *natural selection* as genetic variations increasing the odds of reproducing and surviving are most likely to be passed on to future generations.
- Some genetic variations arise from *mutations* (random errors in gene replication), others from new gene combinations at conception.
- Humans share a genetic legacy and are predisposed to behave in ways that promoted our ancestors' surviving and reproducing.
- Charles Darwin's theory of evolution is an organizing principle in biology. He anticipated today's application of evolutionary principles in psychology.

15-2 How might an evolutionary psychologist explain male-female differences in sexuality and mating preferences?

- Women tend to be more selective than men when choosing sexual partners.
- Evolutionary psychologists reason that men's attraction to multiple healthy, fertile-appearing partners increases their chances of spreading their genes widely.
- Because women incubate and nurse babies, they increase their own and their children's chances of survival by searching for mates with the potential for long-term investment in their joint offspring.

15-3 What are the key criticisms of evolutionary explanations of human sexuality, and how do evolutionary psychologists respond?

- Critics argue that evolutionary psychologists (1) start with an effect and work backward to an explanation, (2) do not recognize social and cultural influences, and (3) absolve people from taking responsibility for their sexual behavior.
- Evolutionary psychologists agree that genes are not destiny, and respond that understanding our predispositions can help us overcome them. They also cite the value of testable predictions based on evolutionary principles, which is the scientific goal of evolutionary psychology.

15-4 What is included in the biopsychosocial approach to development?

- Individual development results from the interaction of biological, psychological, and social-cultural influences.
- Biological influences include our shared human *genome;* individual variations; prenatal environment; and sex-related genes, hormones, and physiology.
- Psychological influences include gene-environment interactions; the effect of early experiences on neural networks; responses evoked by our own characteristics, such as gender and personality; and personal beliefs, feelings, and expectations.
- Social-cultural influences include parental and peer influences, cultural traditions and values, and cultural gender norms.

Multiple-Choice Questions

1. The interaction of biological influences, psychological influences, and social-cultural influences on our behavior is known as

a. evolutionary psychology.
b. epigenetics.
c. the biopsychosocial approach.
d. consciousness.
e. natural selection.

2. Which of the following best describes genetic mutation?

a. Random errors in gene replication
b. The study of the mind’s evolution
c. The study of behavioral evolution
d. Passing on successful, inherited traits
e. Survival of the genetically successful

3. Which of the following is true regarding the initiation of sexual activity?

a. Men are more likely to initiate sexual activity than women.
b. Women are more likely to initiate sexual activity than men.
c. The initiation of sexual activity for both men and women correlates with how many television sitcoms they viewed as children.
d. Men and women are equally likely to initiate sexual activity.
e. Who initiates sexual activity is largely determined by culture.

Practice FRQs

1. Explain how evolutionary psychologists and the concept of social scripts would explain differences in mate selection by men.

Answer

1 point: Evolutionary psychologist would argue that men, in general, choose mates who are younger than they are and are able to have many children. Page 146

1 point: Social scripts would explain that the choice of one’s mate can be determined by cultural scripts and that child bearing may not be the determining factor. Page 146

2. Explain how the nature–nurture debate could be used to support each element of the biopsychosocial approach to explaining human behavior.

(3 points)

UNIT III REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

neuron, p. 81

cell body, p. 82

dendrites, p. 82

axon, p. 82

myelin [MY-uh-lin] sheath, p. 82

glial cells (glia), p. 82

action potential, p. 83

threshold, p. 83

refractory period, p. 83

all-or-none response, p. 83

synapse [SIN-aps], p. 85

neurotransmitters, p. 85

reuptake, p. 86

endorphins [en-DOR-fins], p. 88

agonist, p. 88

antagonist, p. 89

nervous system, p. 91

central nervous system (CNS), p. 92

peripheral nervous system (PNS), p. 92

nerves, p. 92

sensory (afferent) neurons, p. 93

motor (efferent) neurons, p. 93

interneurons, p. 93

somatic nervous system, p. 93

autonomic [aw-tuh-NAHM-ik] nervous system (ANS), p. 93

sympathetic nervous system, p. 93

parasympathetic nervous system, p. 93
reflex, p. 94
endocrine [EN-duh-krin] system, p. 95
hormones, p. 95
adrenal [ah-DREEN-el] glands, p. 95
pituitary gland, p. 96
lesion [LEE-zhuhn], p. 98
EEG (electroencephalogram), p. 99
MEG (magnetoencephalography), p. 99
CT (computed tomography) scan, p. 99
PET (positron emission tomography) scan, p. 99
MRI (magnetic resonance imaging), p. 99
fMRI (functional MRI), p. 100
brainstem, p. 102
medulla [muh-DUL-uh], p. 102
thalamus [THAL-uh-muss], p. 102
reticular formation, p. 102
cerebellum [sehr-uh-BELL-um], p. 103
limbic system, p. 104
amygdala [uh-MIG-duh-la], p. 104
hypothalamus [hi-po-THAL-uh-muss], p. 104
hippocampus, p. 106
cerebral [seh-REE-bruhl] cortex, p. 109
frontal lobes, p. 109
parietal [puh-RYE-uh-tuhl] lobes, p. 109
occipital [ahk-SIP-uh-tuhl] lobes, p. 110
temporal lobes, p. 110
motor cortex, p. 110
somatosensory cortex, p. 113
association areas, p. 114
plasticity, p. 116

neurogenesis, p. 117
corpus callosum [KOR-pus kah-LOW-sum], p. 120
split brain, p. 120
consciousness, p. 123
cognitive neuroscience, p. 124
dual processing, p. 125
blindsight, p. 125
parallel processing, p. 126
sequential processing, p. 126
behavior genetics, p. 129
heredity, p. 129
environment, p. 129
chromosomes, p. 130
DNA (deoxyribonucleic acid), p. 130
genes, p. 130
genome, p. 130
identical (monozygotic) twins, p. 131
fraternal (dizygotic) twins, p. 132
heritability, p. 135
interaction, p. 137
molecular genetics, p. 137
molecular behavior genetics, p. 137
epigenetics, p. 137
evolutionary psychology, p. 141
natural selection, p. 141
mutation, p. 142
social script, p. 146

KEY CONTRIBUTORS TO REMEMBER

Paul Broca, p. 116
Carl Wernicke, p. 116

Roger Sperry, p. 120

Michael Gazzaniga, p. 120

Charles Darwin, p. 141

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. Why do researchers study the brains of animals more than humans?

a. It is not ethical to study human brains.
b. Human brains are too complex to study meaningfully.
c. The same principles govern neural functioning in all species.
d. Human brains contain microbes that could endanger researchers.
e. The technology is still being developed for the study of human brains.

2. What is the brief electrical charge that travels down an axon called?

a. Action potential
b. Resting potential
c. All-or-none impulse
d. Refractory period
e. Reticular formation

3. An individual has been diagnosed with schizophrenia. Which of the following neurotransmitters is most likely to be at fault?

a. Acetylcholine
b. Dopamine
c. Serotonin
d. The endorphins
e. GABA

4. Which is the most influential of the endocrine glands?

a. Pituitary gland
b. Adrenal glands

c. Dendrites
d. Threshold glands
e. Parasympathetic

5. What is the purpose of the myelin sheath?

a. Make the transfer of information across a synapse more efficient
b. Increase the amount of neurotransmitter available in the synapse
c. Reduce the antagonistic effect of certain drugs
d. Establish a resting potential in the axon
e. Speed up the transmission of information within a neuron

6. The peripheral nervous system

a. connects the brain to the spinal cord.
b. calms the body after an emergency.
c. is limited to the control of voluntary movement.
d. controls only the arms and the legs.
e. is the part of the nervous system that does not include the brain and the spinal cord.

7. Which part of the nervous system begins the process for moving the muscles required to walk across the street?

a. Central nervous system
b. Sympathetic nervous system
c. Peripheral nervous system
d. Autonomic nervous system
e. Parasympathetic nervous system

8. Opiate drugs such as morphine are classified as what?

a. Antagonists, because they block neurotransmitter receptors for pain
b. Agonists, because they mimic other neurotransmitters' pain-diminishing effects
c. Excitatory neurotransmitters, because they activate pain-control mechanisms
d. Sympathetic nervous system agents, because they prepare the body

for a challenge
e. Parasympathetic nervous system agents, because they calm the body

9. Which region of the brain plays a significant role in our sense of alertness and arousal?

a. Pons
b. Corpus callosum
c. Parietal lobe
d. Hippocampus
e. Reticular formation

0. Which of the following does a PET scan best allow researchers to examine?

a. The presence of tumors in the brain
b. Increased blood flow to various structures of the brain
c. The size of the internal structures of the brain
d. The location of strokes
e. The activity of various brain regions by monitoring glucose usage

1. A researcher interested in determining the size of a particular area of the brain would be most likely to use which of the following techniques?

a. Lesion
b. EEG
c. MRI
d. fMRI
e. PET scan

2. Damage to the hippocampus would result in what?

a. Difficulties with balance and coordination
b. Difficulty in creating new memories
c. The false sensation of burning in parts of the body
d. Emotional outbursts
e. Inability to regulate body temperature and hunger

3. Surgical stimulation of the somatosensory cortex might result in the false sensation of what?

a. Music
b. Flashes of colored light
c. Someone whispering your name
d. Someone tickling you
e. A bad odor

4. During which task might the right hemisphere of the brain be most active?

a. Solving a mathematical equation
b. Reading
c. Making a brief oral presentation to a class
d. Imagining what a dress would look like on a friend
e. Solving a logic problem

5. Brain plasticity refers to which of the following?

a. Healthy human brain tissue
b. The ability of the brain to transfer information from one hemisphere to the other
c. How a brain gets larger as a child grows
d. A wide variety of functions performed by the human brain
e. The ability of brain tissue to take on new functions

6. When Klüver and Bucy surgically lesioned the amygdala of a rhesus monkey’s brain, what was the impact on the monkey’s behavior?

a. Lost its ability to coordinate movement
b. Died because its heartbeat became irregular
c. Became less aggressive
d. Lost its memory of where food was stored
e. Sank into an irreversible coma

7. An individual experiences brain damage that results in an inability to make plans about the future. Which part of the brain was probably damaged?

a. Parietal lobe
b. Corpus callosum
c. Frontal lobe
d. Occipital lobe
e. Temporal lobe

8. Evolutionary psychologists seek to understand how traits and behavioral tendencies have been shaped by what?

a. Natural selection
b. Genes
c. Prenatal nutrition
d. DNA
e. Chromosomes

9. Which is one of the major criticisms of the evolutionary perspective in psychology?

a. It analyzes after the fact using hindsight.
b. It attempts to extend a biological theory into a psychological realm.
c. There is very little evidence to support it.
d. It has not been around long enough to “stand the test of time.”
e. It seems to apply in certain cultures but not in others.

0. What was one of the major findings of Thomas Bouchard’s study of twins?

a. It demonstrated that peer influence is more important than parental influence in the development of personality traits.
b. It proved that the influence of parental environment becomes more and more important as children grow into adults.
c. He discovered striking similarities between adult identical twins who had been separated near birth.
d. Fraternal twins showed almost as much similarity as identical twins when they reached adulthood.
e. It provided evidence that heritability is less important than

researchers previously suspected.

1. Which of the following statements has been supported by the research of evolutionary psychologists?

a. Women are attracted to older men.
b. Men are attracted to women who appear fertile and capable of bearing children.
c. The connection between sex and pleasure is mostly determined by culture.
d. The same factors determine sexual attraction in both males and females.
e. Most adults are attracted to partners that in some way remind them of their parents.

2. Why do researchers find the study of fraternal twins important?

a. They share similar environments and the same genetic code.
b. Data collected concerning their similarities is necessary for calculating heritability.
c. They are the same age and are usually raised in similar environments, but they do not have the same genetic code.
d. Results allow us to determine exactly how disorders ranging from heart disease to schizophrenia are inherited.
e. They are typically raised in less similar environments than nontwin siblings.

3. Heritability refers to the percentage of what?

a. Group variation in a trait that can be explained by environment
b. Traits shared by identical twins
c. Traits shared by fraternal twins
d. Traits shared by adopted children and their birth parents
e. Variation in a trait across individuals that can be explained by genetics

4. What is the study of how the structure and function of genes interact with our environment to influence behavior called?

a. Molecular behavior genetics
b. Evolutionary psychology
c. Biopsychosocialism
d. Heritability
e. Natural selection

5. Why do researchers use adoption studies in an effort to reveal genetic influences on personality?

a. To compare adopted children with nonadopted children
b. To study the effect of prior neglect on adopted children
c. To study the effect of a child's age at adoption
d. To evaluate whether adopted children more closely resemble their adoptive parents or their biological parents
e. To consider the effects of adoption on a child's manners and values

Free-Response Questions

1. Charlotte is 88 years old and is feeling the effects of her long life. She suffered a stroke five years ago, which left the right side of her body limp. She also sometimes has trouble understanding when she is asked questions. Her doctors believe that she also may be suffering from the beginning stages of Alzheimer's disease. Explain how each might contribute to Charlotte's current circumstance.

- Motor cortex
- Acetylcholine
- Association areas
- Plasticity
- Epigenetics

Rubric for Free Response Question 1

1 point: Because Charlotte's right side is limp, the damage from her stroke most likely occurred in the left hemisphere and potentially in her left motor cortex, which would leave her with little muscular control over the right side of her body. Page 110

1 point: If Charlotte suffers from Alzheimer’s disease, it is possible that the neurons responsible for producing acetylcholine have deteriorated. Page 87

1 point: If Charlotte’s association areas have been damaged, it may be difficult for her to integrate new ideas. She may also have trouble retrieving memories that were once easily recalled. Page 114

1 point: Because of Charlotte’s age, her brain will not have the ability to build an abundance of new neural networks, and if she has not recovered from her injury in a few months’ time, she is likely to make little progress in her recovery. Page 116

1 point: Perhaps Charlotte has a predisposition for Alzheimer’s disease. If she was in an environment that was not enriching and cognitively engaging, it may have made Alzheimer’s disease more likely. On the other hand, despite having a genetic predisposition for Alzheimer’s disease, if Charlotte was exposed to an enriching environment, her disposition may not have been expressed. Page 137

2. If a person accidentally touches a pan filled with hot water on the stove, they will immediately move their hand away from the hot pan before yelling out in pain. Use the following terms to explain what is involved in this reaction.

- Neurotransmitters
- The endocrine system
- Thalamus
- Amygdala
- Sensory cortex
- Pain reflex

(6 points)

3. Dr. Nation is a biological psychologist interested in studying genetic influences on intelligence. Briefly describe a study Dr. Nation might design to investigate the research question: “How do genetics and environmental influences interact to impact our intelligence?” Use the following terms in context in your description:

- Heritability
- Epigenetics
- Fraternal or identical twins
- fMRI

(4 points)

UNIT IV Sensation and Perception

Claudia Masur/Gallery Stock

MODULES

16 Basic Concepts of Sensation and Perception

17 Influences on Perception

18 Vision: Sensory and Perceptual Processing

19 Visual Organization and Interpretation

20 Hearing

21 The Other Senses

"I have perfect vision," explains acclaimed writer and teacher

Heather Sellers. Her vision may be perfect, but her perception is not. In her memoir, *You Don't Look Like Anyone I Know* (2010), she tells of awkward moments resulting from her lifelong *prosopagnosia*—face blindness.

> In college, on a date at the Spaghetti Station, I returned from the bathroom and plunked myself down in the wrong booth, facing the wrong man. I remained unaware he was not my date even as my date (a stranger to me) accosted Wrong Booth Guy, and then stormed out. . . . I do not recognize myself in photos or videos. I can't recognize my stepsons in the soccer pick-up line; I failed to determine which husband was mine at a party, in the mall, at the market.

"Voice blind" people with *phonagnosia*—an inability to recognize familiar voices—may make similar mistakes. One man flirted on the phone with someone he presumed was his wife, not realizing it was a different woman (Spiegel, 2010).

To avoid being perceived as snobby or aloof, Sellers sometimes fakes recognition. She often smiles at people she passes in case she knows them. Or she pretends to know the person with whom she is talking. (Similarly, those of us with hearing loss often fake hearing.) But, Sellers points out, there is an upside: When encountering someone who previously irritated her, she typically feels no ill will—she doesn't recognize the person.

Unlike Sellers, most of us have (as Module 18 explains) a functioning area on the underside of our brain's right hemisphere that helps us recognize a familiar human face as soon as we detect it—in only one-seventh of a second (Jacques & Rossion, 2006; Rossion & Boremanse, 2011). This remarkable ability illustrates a broader principle: *Nature's sensory gifts enable each animal to obtain essential information.* Other examples:

- Human ears are most sensitive to sound *frequencies* that include human voices, especially a baby's cry.
- Frogs, which feed on flying insects, have cells in their eyes that

fire only in response to small, dark, moving objects. A frog could starve to death knee-deep in motionless flies. But let one zoom by and the frog’s “bug detector” cells snap awake. (As Kermit the Frog said, “Time’s fun when you’re having flies.”)
- Male silkworm moths’ odor receptors can detect one-billionth of an ounce of chemical sex attractant per second, released by a female one mile away (Sagan, 1977). That helps explain why there continue to be silkworms.

In this unit, we’ll look at what psychologists have learned about how we sense and perceive our world. We begin by considering some basic principles that apply to all our senses.

▶ **Unit IV Overview Video**

Module **16 Basic Concepts of Sensation and Perception**

LEARNING TARGETS

- 16-1 Describe *sensation* and *perception*, and explain the difference between *bottom-up processing* and *top-down processing*.
- 16-2 Discuss how selective attention directs our perceptions.
- 16-3 Describe the three steps that are basic to all our sensory systems.
- 16-4 Discuss the difference between *absolute thresholds* and *difference thresholds*.
- 16-5 Discuss how we are affected by subliminal stimuli.
- 16-6 Explain the function of sensory adaptation.

How do we create meaning from the blizzard of sensory stimuli that bombards our bodies 24 hours a day? Meanwhile, in a silent, cushioned, inner world, our brain floats in utter darkness. By itself, it sees nothing. It hears nothing. It feels nothing. *So, how does the world out there get in?* To phrase the question scientifically: How do we construct our representations of the external world? How do a campfire’s flicker, crackle, and smoky scent activate neural connections? And how, from this living neurochemistry, do we create our conscious experience of the fire’s motion and temperature, its aroma and beauty? In search of answers, let’s examine the basics of sensation and perception.

Processing Sensation and Perception

16-1 What are *sensation* and *perception?* What do we mean by *bottom-up processing* and *top-down processing?*

Flip It Video: Top-Down and Bottom-Up Processing

Heather Sellers' curious mix of "perfect vision" and face blindness illustrates the distinction between *sensation* and *perception*. When she looks at a friend, her **sensation** is normal. Her **sensory receptors** detect the same information yours would, and her nervous system transmits that information to her brain. Her **perception**—the processes by which her brain organizes and interprets sensory input—is *almost* normal. Thus, she may recognize people from their hair, gait, voice, or particular physique, just not from their face. Her experience is much like the struggle any human would have trying to recognize a specific penguin.

sensation

the process by which our sensory receptors and nervous system receive and represent stimulus energies from our environment.

sensory receptors

sensory nerve endings that respond to stimuli.

perception

the process of organizing and interpreting sensory information, enabling us to recognize meaningful objects and events.

Under normal circumstances, sensation and perception blend into one continuous process. In this module, we slow down that process to study its parts; in real life, your sensory and perceptual processes work together to help you decipher the world around you.

- **Bottom-up processing** starts at your sensory receptors and works up to higher levels of processing.

- **Top-down processing** constructs perceptions from this sensory input by drawing on your experience and expectations.

bottom-up processing

analysis that begins with the sensory receptors and works up to the brain's integration of sensory information.

top-down processing

information processing guided by higher-level mental processes, as when we construct perceptions drawing on our experience and expectations.

As your brain absorbs the information in **Figure 16.1**, bottom-up processing enables your sensory systems to detect the lines, angles, and colors that form the flower and leaves. Using top-down processing, you interpret what your senses detect.

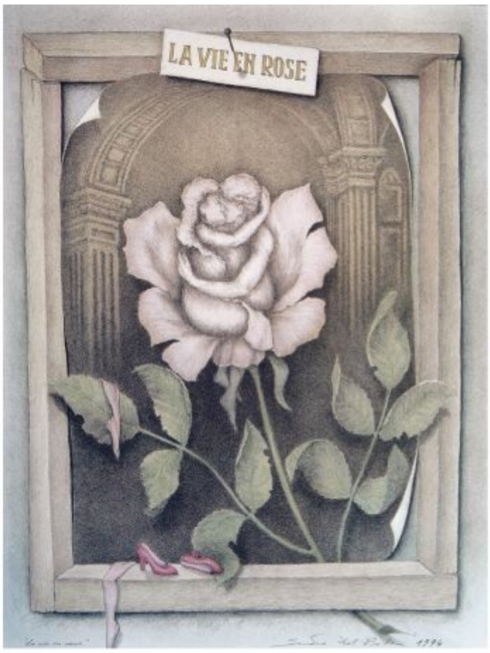


Figure 16.1
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© Sandro Del-Prete/www.sandrodelprete.com

Figure 16.1 What's going on here?

Our sensory and perceptual processes work together to help us sort out complex images, including the hidden couple in Sandro Del-Prete’s drawing, *The Flowering of Love*.

Selective Attention

16-2 How does selective attention direct our perceptions?

Through **selective attention**, our awareness focuses, like a flashlight beam, on a minute aspect of all that we experience. We may think we can fully attend to a conversation or a class lecture while checking and returning text messages. Actually, our consciousness focuses on but one thing at a time.

selective attention

the focusing of conscious awareness on a particular stimulus.

By one estimate, our five senses take in 11,000,000 bits of information per second, of which we consciously process about 40 (Wilson, 2002). Yet our mind's unconscious track intuitively makes great use of the other 10,999,960 bits.

What captures our limited attention? Things we deem important. A classic example of selective attention is the *cocktail party effect*—your ability to attend to one voice among a sea of other voices. But what happens when another voice speaks your name? Your cognitive radar, operating on your mind's other track (and in your right frontal cortex), instantly brings that unattended voice into consciousness (Demeter & Woldorff, 2016). This effect might have prevented an embarrassing and dangerous situation in 2009, when two Northwest Airlines pilots "lost track of time." Focused on their laptops and in conversation, they ignored alarmed air traffic controllers' attempts to reach them and overflew their Minneapolis destination by 150 miles. If only the controllers had known and spoken the pilots' names.

Selective Attention and Accidents

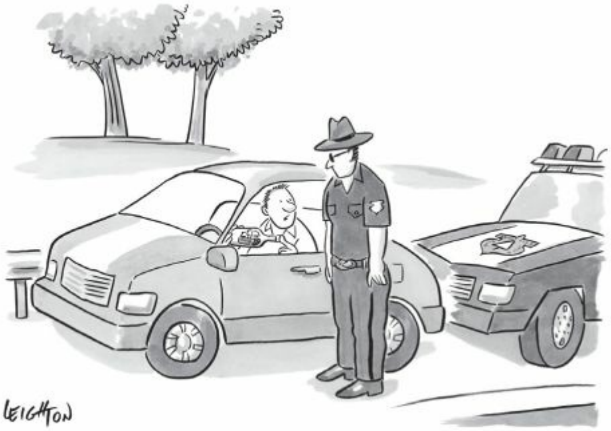
Text, attend to your musical selections, or chat on your phone while driving, and your selective attention will shift back and forth between the road and its electronic competition. Indeed, our attention shifts more often than we realize. One study left people in a room for 28 minutes with full Internet and television access. On average, they guessed their attention switched 15 times. But they were not even close. Eye-tracking revealed eight times that many attentional switches—120 in all (Brasel & Gips, 2011).

Rapid toggling between activities is today's great enemy of sustained, focused attention. When we switch attentional gears, especially when we shift to complex tasks like noticing and avoiding cars around us, we pay a toll—a slight and sometimes fatal delay in coping (Rubenstein et al., 2001). When a driver attends to a conversation, activity in brain areas vital to driving decreases an average of 37 percent (Just et al., 2008).

AP® EXAM TIP

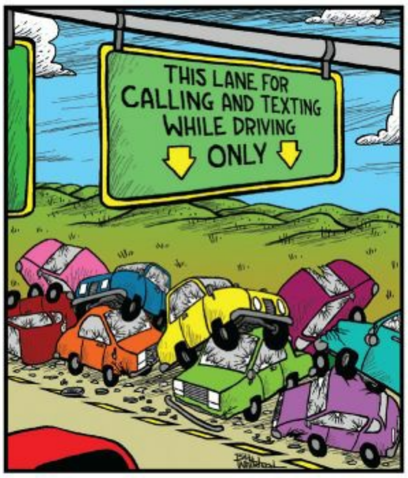
You may wish to think about how the information on selective attention relates to something a little less dangerous: studying. The same principles apply. The more time you spend texting, tweeting, and social networking, the less focused you'll be on the material you're trying to master. A better strategy is to spend 25 minutes doing schoolwork and schoolwork alone. Then you can reward yourself with a few minutes of online time.

Texting or phone chatting—something 1 in 4 drivers admit doing—accompanies about 28 percent of traffic accidents (NSC, 2010; Pew, 2011). One video cam study of teen drivers found that driver distraction from passengers or phones occurred right before 58 percent of their crashes (AAA, 2015). Talking with passengers raises the risk of an accident 1.6 times above normal. Using a cell phone (even a hands-free set) carries a risk 4 times higher than normal—equal to the risk of drunk driving (McEvoy et al., 2005, 2007). And while talking is distracting, texting wins the danger game. One 18-month video cam study tracked the driving habits of long-haul truckers. When they were texting, their risk of a collision increased 23 times (Olson et al., 2009)! Many European countries and most American states and Canadian provinces now ban texting while driving (CBC, 2014; Rosenthal, 2009). So the next time you're behind the wheel, put the brakes on your texts. Your passengers, fellow drivers, and selective attention will thank you.



The New Yorker Collection, 2009, Robert Leighton, from cartoonbank. com. All Rights Reserved.

"I wasn't texting. I was building this ship in a bottle."



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Driven to distraction In driving-simulation experiments, people whose attention is diverted by cell-phone conversation make more driving errors.

Inattentional Blindness

At the level of conscious awareness, we are "blind" to all but a tiny sliver of visual stimuli. Ulric Neisser (1979) and Robert Becklen and Daniel Cervone (1983) demonstrated this **inattentional blindness** dramatically by showing people a one-minute video of basketball players, three in black shirts and three in white shirts, tossing a ball. Researchers told the viewers to press a key every time they saw a black-shirted player pass the ball. Most viewers were so intent on their task that they failed to notice a young woman carrying an umbrella saunter across the screen midway through the video (**Figure 16.2**). Watching a replay of the video, viewers were astonished to see her (Mack & Rock, 2000). This inattentional blindness is a by-product of what we are really good at: focusing attention on some part of our environment.

inattentional blindness

failing to see visible objects when our attention is directed elsewhere.

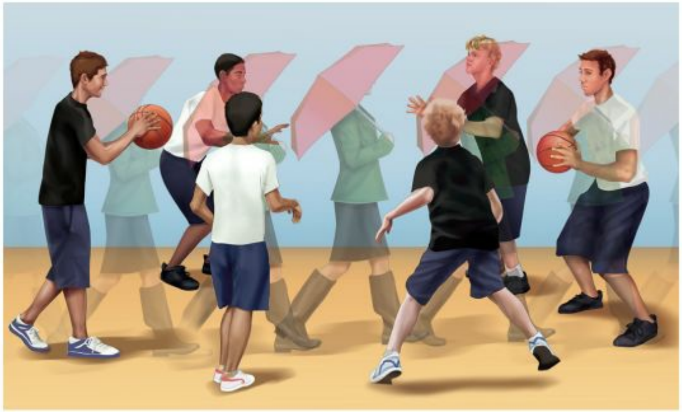

Figure 16.2
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Figure 16.2 Selective inattention

Viewers who were attending to basketball tosses among the black-shirted players usually failed to notice the umbrella-toting woman sauntering across the screen (Neisser, 1979).

In a repeat of the experiment, smart-aleck researchers sent a gorilla-suited assistant through the swirl of players (Simons & Chabris, 1999). During its 5- to 9-second cameo appearance, the gorilla paused and thumped its chest. But the gorilla did not steal the show: Half the conscientious pass-counting viewers failed to see it. Psychologists like to have fun and have continued to do so with invisible gorillas. One study of “inattentional deafness” delivered, separately to each ear, a recording of men talking and of women talking. When volunteers were assigned to pay attention to the women, 70 percent failed to hear one of the men saying, over and over for 19 seconds, “I’m a gorilla” (Dalton & Fraenkel, 2012). And when 24 radiologists were looking for cancer nodules in lung scans, 20 of them missed the gorilla superimposed in the upper right of **Figure 16.3**—though, to their credit, their focus enabled them to spot the much tinier cancer tissue (Drew et al., 2013). The serious point to this psychological mischief: Attention is powerfully selective. Your conscious mind is in one place at a time.

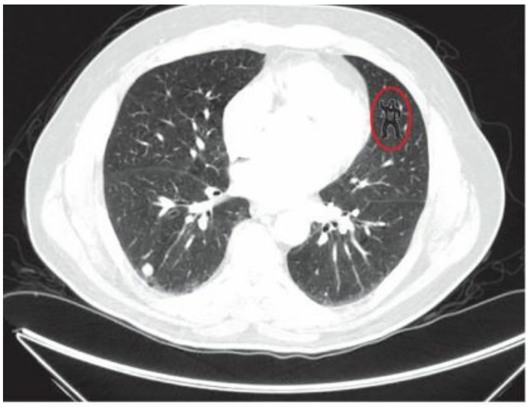

Figure 16.3
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Trafton Drew

Figure 16.3 The invisible gorilla strikes again

When repeatedly exposed to the gorilla in the upper right while searching for much tinier cancer nodules, radiologists usually failed to see it (Drew et al., 2013).

Given that most people miss someone in a gorilla suit while their attention is riveted elsewhere, imagine the fun that others can have by manipulating our selective attention. Misdirect people’s attention and they will miss the hand slipping into the pocket. “Every time you perform a magic trick, you’re engaging in experimental psychology,” says magician Teller, a master of mind-messing methods (2009). Clever thieves know this, too. One Swedish psychologist was surprised in Stockholm by a woman exposing herself; only later did he realize that he had been pickpocketed, outwitted by thieves who understood the power of selective inattention (Gallace, 2012).

In other experiments, people exhibited a form of inattentional blindness called **change blindness.** In laboratory experiments, viewers failed to notice that, after a brief visual interruption, a big Coke bottle had disappeared, a railing had risen, clothing had changed color—and construction workers had changed places (**Figure 16.4**). (Chabris & Simons, 2010; Resnick et al., 1997). Out of sight, out of mind.

change blindness

failing to notice changes in the environment; a form of *inattentional blindness.*

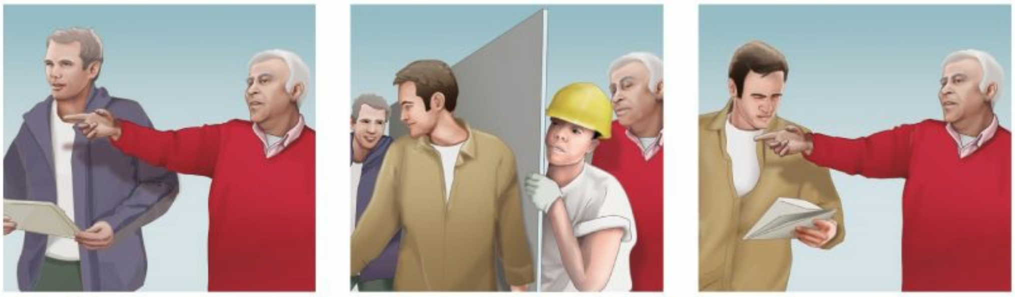

Figure 16.4

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Figure 16.4 Change blindness

While a man (in red) provides directions to a construction worker, two experimenters rudely pass between them carrying a door. During this interruption, the original worker switches places with another person wearing different-colored clothing. Most people, focused on their direction giving, do not notice the switch (Simons & Levin, 1998).

A Swedish research team discovered that people's inattentional blindness extends to their own choices. Petter Johansson and his colleagues (2005, 2014) showed 120 volunteers two female faces and asked which face was more attractive. After putting both photos face down, they handed viewers the one chosen and invited them to explain why they preferred it. But on 3 of 15 occasions, the researchers secretly switched the photos—showing viewers the face they had *not* chosen (**Figure 16.5**). People noticed the switch only 13 percent of the time, and readily explained why they preferred the face they had actually rejected. “I chose her because she smiled,” said one person (after picking the solemn-faced one). Asked later whether they would notice such a switch in a “hypothetical experiment,” 84 percent insisted they would.

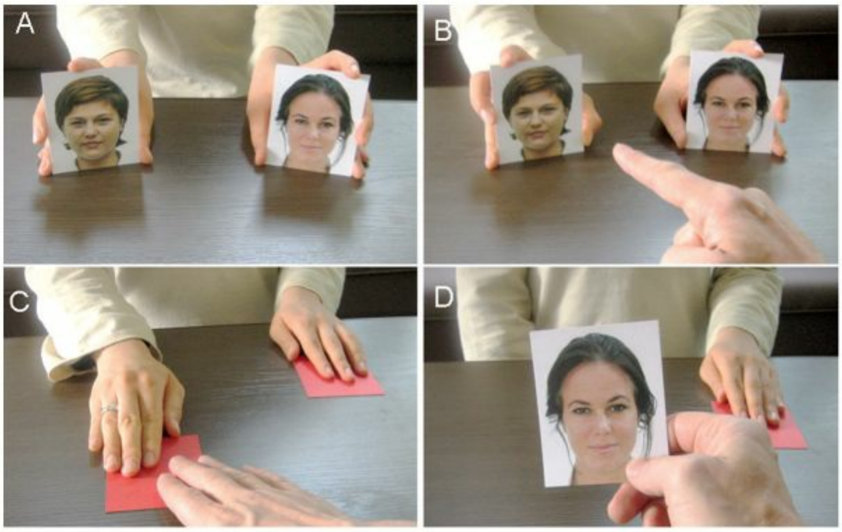

Figure 16.5
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Mark Hanlon

Figure 16.5 Choice blindness

Petter Johansson, Lars Hall, and others (2005) invited people to choose preferred faces. On occasion, they asked people to explain their preference for the *unchosen* photo. Most—failing to notice the switch—readily did so.

Change deafness can also occur. In one experiment, 40 percent of people focused on repeating a list of words that someone spoke failed to notice a change in the person speaking (Vitevitch, 2003). In two follow-up phone interview experiments, only 2 of 40 people noticed that the female interviewer changed after the third question—a change that was noticeable if people were forewarned of a possible interviewer change (Fenn et al., 2011). Some stimuli, however, are so powerful, so strikingly distinct, that we experience *popout*. For example, when the female phone interviewer changed to a male interviewer, virtually everyone noticed.

Transduction

16-3 What three steps are basic to all our sensory systems?

Every second of every day, our sensory systems perform an amazing feat: They convert one form of energy into another. Vision processes light energy. Hearing processes sound waves. All our senses

- *receive* sensory stimulation, often using specialized receptor cells.
- *transform* that stimulation into neural impulses.
- *deliver* the neural information to our brain.

The process of converting one form of energy into another form that our brain can use is called **transduction**. Transduction is rather like translation—of a physical energy such as light waves into the brain's electrochemical language. Later in this unit, we'll focus on individual sensory systems. How do we see? Hear? Feel pain? Taste? Smell? Keep our balance? In each case, one of our sensory systems receives, transforms, and delivers the information to our brain. The field of **psychophysics** studies the relationships between the physical energy we can detect and its effects on our psychological experiences.

transduction

conversion of one form of energy into another. In sensation, the transforming of stimulus energies, such as sights, sounds, and smells, into neural impulses our brain can interpret.

psychophysics

the study of relationships between the physical characteristics of stimuli, such as their intensity, and our psychological experience of them.

Let's explore some strengths and weaknesses in our ability to detect and interpret stimuli in the vast sea of energy around us.

Thresholds

16-4 How do *absolute thresholds* and *difference thresholds* differ?

At this moment, we are being struck by X-rays and radio waves, ultraviolet and infrared light, and sound waves of very high and very low frequencies. To all of these we are blind and deaf. Other animals with differing needs detect a world that lies beyond our experience. Migrating birds stay on course aided by an internal magnetic compass. Bats and dolphins locate prey using sonar, bouncing echoing sound off objects. Bees navigate on cloudy days by detecting invisible (to us) polarized light.

Our senses open the shades just a crack, allowing us a restricted awareness of this vast sea of energy. But for our needs, this is enough.

TRY THIS

Try out this old riddle on a couple of friends. “You’re driving a bus with 12 passengers. At your first stop, 6 passengers get off. At the second stop, 3 get off. At the third stop, 2 more get off but 3 new people get on. What color are the bus driver’s eyes?” Do your friends detect the signal—who is the bus driver?—amid the accompanying noise?

Absolute Thresholds

Flip It Video: Signal Detection Theory

To some kinds of stimuli we are exquisitely sensitive. Standing atop a mountain on an utterly dark, perfectly clear night, most of us could see a candle flame atop another mountain 30 miles away. We could feel the wing of a bee falling on our cheek. We could smell a single drop of perfume in a three-room apartment (Galanter, 1962).

German scientist and philosopher Gustav Fechner (1801–1887) studied the edge of our awareness of these faint stimuli, which he called their **absolute thresholds**—the minimum stimulation necessary to detect a particular light, sound, pressure, taste, or odor 50 percent of the time. To test your absolute threshold for sounds, a hearing specialist would send tones, at varying levels, into each of your ears and record whether you could hear each tone (Figure 16.6). The test results would show the point where, for any sound frequency, half the time you could detect the sound and half the time you could not. That 50-50 point would define your absolute threshold.

absolute threshold

the minimum stimulus energy needed to detect a particular stimulus 50 percent of the time.

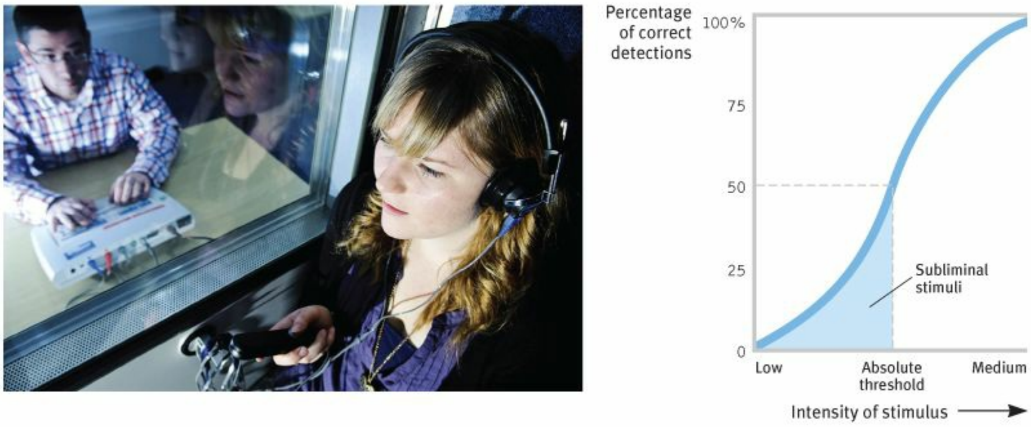

Figure 16.6
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Photo: Dan Dunkley/Science Source

Figure 16.6 Absolute threshold

Can I detect this sound? An *absolute threshold* is the intensity at which a person can detect a stimulus half the time. Hearing tests locate these thresholds for various frequencies.

Detecting a weak stimulus, or signal (such as a hearing-test tone), depends not only on its strength but also on our psychological state—our experience, expectations, motivation, and alertness. **Signal detection theory** predicts when we will detect weak signals (measured as our ratio of “hits” to “false alarms”). Signal detection theorists seek to understand why people respond differently to the same stimuli (have you noticed that some teachers are more likely than others to detect students texting during class?), and why the same person’s reactions vary as circumstances change—as when creaking sounds trigger fear for someone home alone after watching a scary movie.

signal detection theory

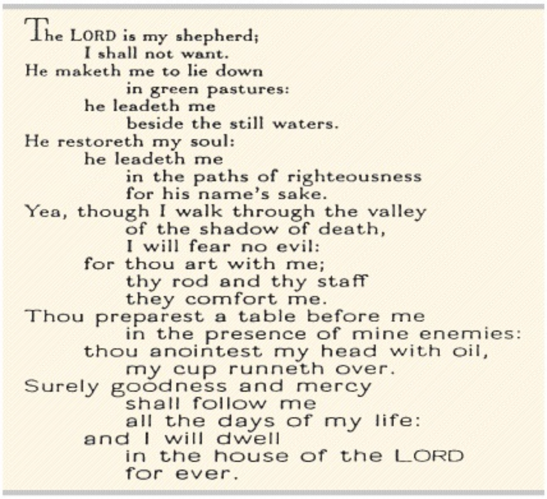
a theory predicting how and when we detect the presence of a faint stimulus *(signal)* amid background stimulation *(noise)*. Assumes there is no single absolute threshold and that detection depends partly on a person’s experience, expectations, motivation, and alertness.

Stimuli you cannot consciously detect 50 percent of the time are **subliminal**—below your absolute threshold (Figure 16.6). Can we be *controlled* by subliminal messages? For more on that question, see Thinking Critically About: Subliminal Sensation and Subliminal Persuasion.

subliminal

below one’s absolute threshold for conscious awareness.

Difference Thresholds



The LORD is my shepherd;
I shall not want.
He maketh me to lie down
in green pastures:
he leadeth me
beside the still waters.
He restoreth my soul:
he leadeth me
in the paths of righteousness
for his name’s sake.
Yea, though I walk through the valley
of the shadow of death,
I will fear no evil:
for thou art with me;
thy rod and thy staff
they comfort me.
Thou preparest a table before me
in the presence of mine enemies:
thou anointest my head with oil,
my cup runneth over.
Surely goodness and mercy
shall follow me
all the days of my life:
and I will dwell
in the house of the LORD
for ever.

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The difference threshold In this computer-generated copy of the Twenty-third Psalm, each line of the typeface increases slightly. How many lines are required for you to experience a just noticeable difference?

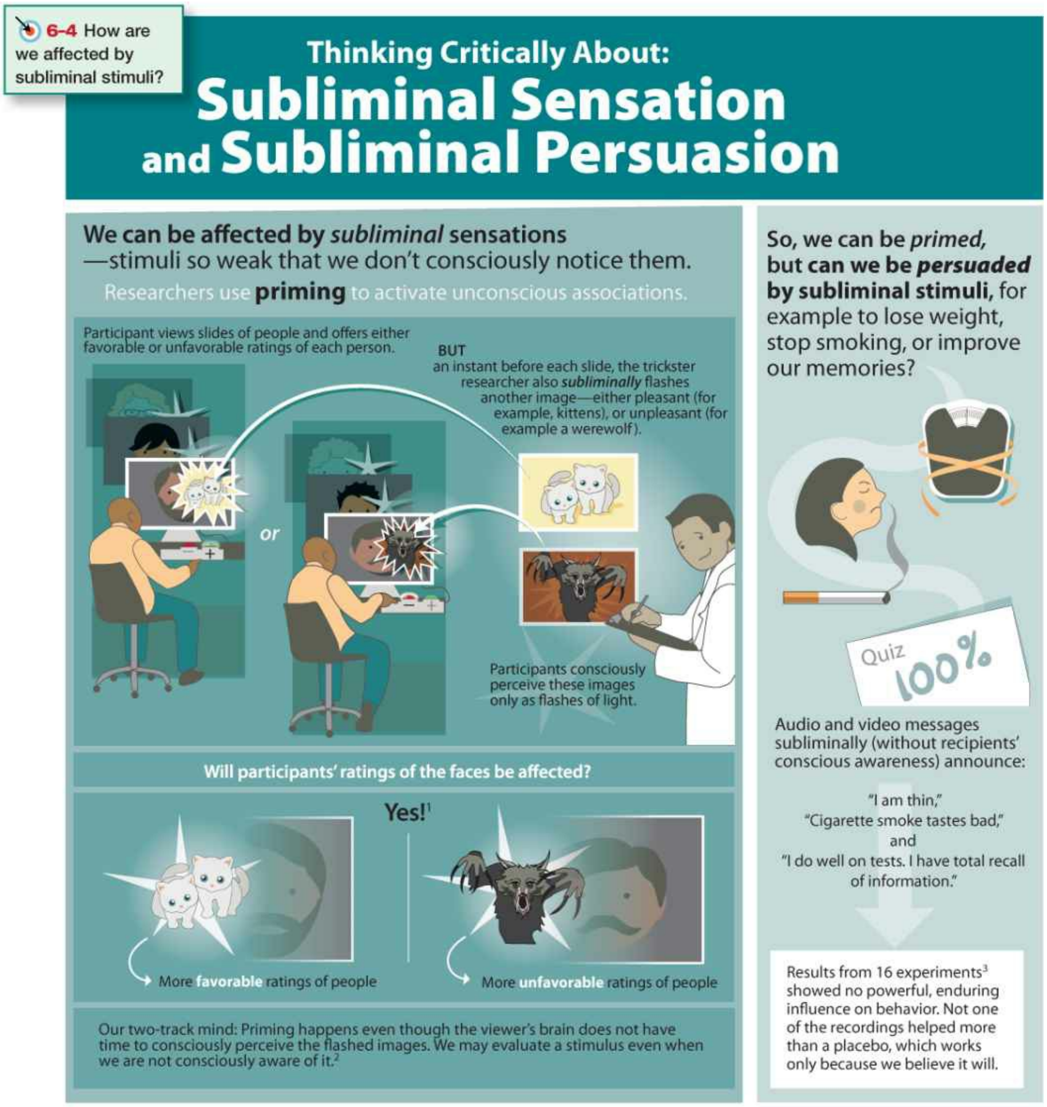
To function effectively, we need absolute thresholds low enough to allow us to detect important sights, sounds, textures, tastes, and smells. We also need to detect small differences among stimuli. A musician must detect minute discrepancies when tuning an instrument. Students in the hallway will detect the sound of their friends' voices amid all the other voices. Even after I [DM] had spent two years in Scotland, all lambs' *baas* sounded alike to my ears. But not to their mothers', I observed. After shearing, each ewe would streak directly to the *baa* of *her* lamb amid the chorus of other distressed lambs.

Eric Isselee/Shutterstock

The **difference threshold** (or the *just noticeable difference [jnd]*) is the minimum stimulus difference a person can detect half the time. That detectable difference increases with the size of the stimulus. If we listen to our music at 40 decibels, we might barely detect an added 5 decibels (the jnd). But if we increase the volume to 110 decibels, we probably won't then detect an additional 5-decibel change.

difference threshold

the minimum difference between two stimuli required for detection 50 percent of the time. We experience the difference threshold as a *just noticeable* *difference* (or *jnd*).



6-4 How are we affected by subliminal stimuli?

Thinking Critically About:

Subliminal Sensation and Subliminal Persuasion

We can be affected by *subliminal* sensations —stimuli so weak that we don't consciously notice them.

Researchers use **priming** to activate unconscious associations.

Participant views slides of people and offers either favorable or unfavorable ratings of each person.

BUT an instant before each slide, the trickster researcher also ***subliminally*** flashes another image—either pleasant (for example, kittens), or unpleasant (for example a werewolf).

Participants consciously perceive these images only as flashes of light.

Will participants' ratings of the faces be affected?

Yes![1]

More **favorable** ratings of people

More **unfavorable** ratings of people

Our two-track mind: Priming happens even though the viewer's brain does not have time to consciously perceive the flashed images. We may evaluate a stimulus even when we are not consciously aware of it.[2]

So, we can be *primed*, but can we be *persuaded* by subliminal stimuli, for example to lose weight, stop smoking, or improve our memories?

Audio and video messages subliminally (without recipients' conscious awareness) announce:

"I am thin,"
"Cigarette smoke tastes bad,"
and
"I do well on tests. I have total recall of information."

Results from 16 experiments[3] showed no powerful, enduring influence on behavior. Not one of the recordings helped more than a placebo, which works only because we believe it will.

1. Krosnick et al., 1992. 2. Ferguson & Zayas, 2009. 3. Greenwald et al., 1991, 1992.

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priming

the activation, often unconsciously, of certain associations, thus predisposing one's perception, memory, or response.

In the late 1800s, Ernst Weber described this with a principle so simple and so widely applicable that we still refer to it as **Weber's law:** For an average person to perceive a difference, two stimuli must differ by a constant minimum *percentage* (not a constant *amount*). The exact percentage varies, depending on the stimulus. Two lights, for example, must differ in intensity by 8 percent. Two objects must differ in weight by 2 percent. And two tones must differ in frequency by only 0.3 percent (Teghtsoonian, 1971).

Weber's law

the principle that, to be perceived as different, two stimuli must differ by a constant minimum percentage (rather than a constant amount).

Sensory Adaptation

16-6 What is the function of sensory adaptation?

Sitting down in class, you notice a nearby student’s heavy perfume. You wonder how she endures it, but within minutes you no longer notice. **Sensory adaptation** has come to your rescue. When constantly exposed to an unchanging stimulus, we become less aware of it because our nerve cells fire less frequently. (To experience sensory adaptation, put a pen behind your ear. You will feel it—but only for a few moments.)

sensory adaptation

diminished sensitivity as a consequence of constant stimulation.

Why, then, if we stare at an object without flinching, does it *not* vanish from sight? Because, unnoticed by us, our eyes are always moving. This continual flitting from one spot to another ensures that stimulation on the eyes’ receptors continually changes (**Figure 16.7**).

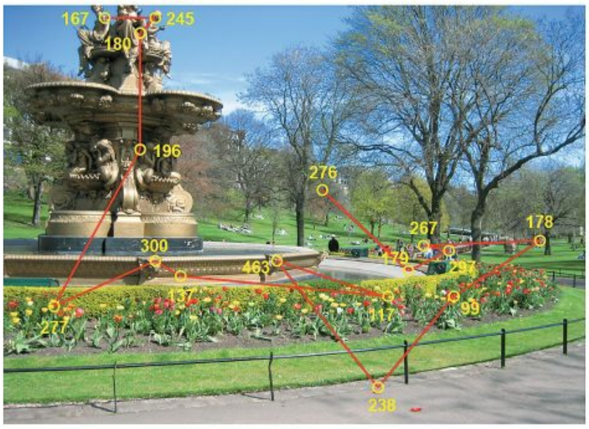

Figure 16.7
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Figure 16.7 The jumpy eye

Our gaze jumps from one spot to another every third of a second or so, as eye-tracking equipment illustrated as a person looked at this photograph of Edinburgh's Princes Street Gardens (Henderson, 2007). The circles represent visual fixations, and the numbers indicate the time of fixation in milliseconds (300 milliseconds = 3/10ths of a second).

What if we actually could stop our eyes from moving? Would sights seem to vanish, as odors do? To find out, psychologists have devised ingenious instruments that maintain a constant image on the eye's inner surface. Imagine that we have fitted a volunteer, Mary, with such an instrument—a miniature projector mounted on a contact lens (**Figure 16.8**). When Mary's eye moves, the image from the projector moves as well. So everywhere that Mary looks, the scene is sure to go.

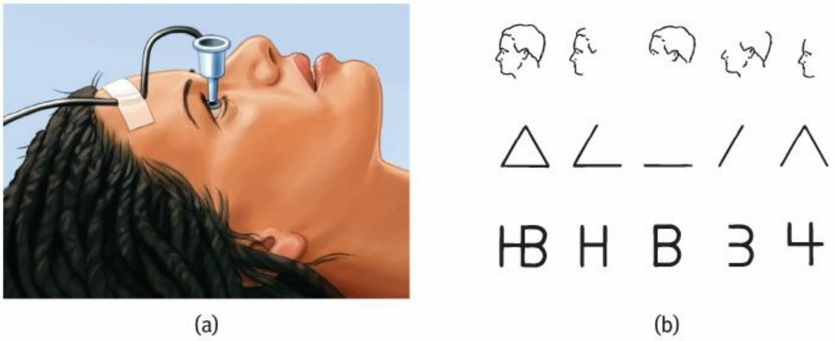

Figure 16.8
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From "Stabilized images on the retina," by R. M. Pritchard. Copyright © 1961 Scientific American, Inc. All Rights Reserved.

Figure 16.8 Sensory adaptation: Now you see it, now you don't!

(a) A projector mounted on a contact lens makes the projected image move with the eye. (b) Initially, the person sees the stabilized image —but soon, thanks to sensory adaptation, her eye becomes accustomed to the unchanging stimulus. Rather than the full image, she begins to see fragments fading and reappearing.

If we project images through this instrument, what does Mary see? At first, she sees the complete image. But within a few seconds, as her sensory system begins to fatigue, things get weird. Bit by bit, the image vanishes, only to reappear and then disappear—often in fragments (Figure 16.8b).

> “*We need above all to know about changes; no one wants or needs to be reminded 16 hours a day that his shoes are on.*”
>
> *Neuroscientist David Hubel (1979)*

Although sensory adaptation reduces our sensitivity, it offers an important benefit: freedom to focus on informative changes in our environment. The attention-grabbing power of changing stimulation helps explain why a smart phone’s notifications are so hard to ignore. New tweets, likes, snapchats, and breaking news stories pop up and capture our attention. If we’re performing other tasks, these intrusions can harm our performance (Stothart et al., 2015). Ditto for TV, which led one researcher to marvel at how TV cuts, zooms, and pans distract, even during interesting conversations: “I cannot for the life of me stop from periodically glancing over to the screen” (Tannenbaum, 2002).

Sensory adaptation even influences how we perceive emotions. By creating a 50-50 morphed blend of an angry face and a scared face, researchers showed that our visual system adapts to a facial expression (as on the left or right of **Figure 16.9**) by becoming less responsive to it (Butler et al., 2008). The effect is created by our brain, not our retinas. We know this because the illusion also works when we view either side image with one eye, and the center image with the other eye.

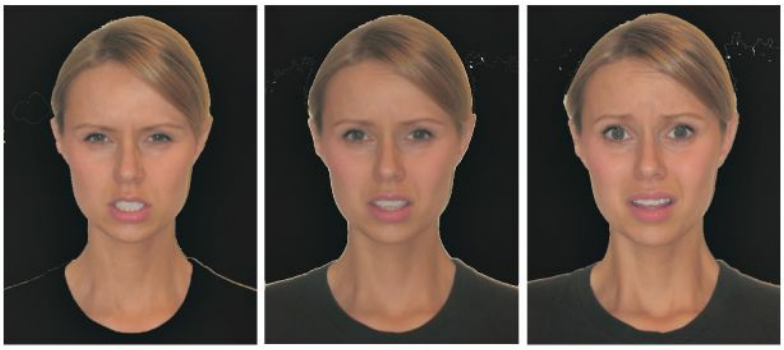


Figure 16.9
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Scientific American Mind, Andrea Butler, Ipek Oruc, Christopher J. Fox, Jason J. S. Barton. *Brain Research*, 29 January 2008.

Figure 16.9 Emotion adaptation

Gaze at the angry face on the left for 20 to 30 seconds, then look at the center face (looks scared, yes?). Then gaze at the scared face on the right for 20 to 30 seconds, before returning to the center face (now looks angry, yes?). (From Butler et al., 2008.)

The point to remember: Our sensory system is alert to novelty; bore it with repetition and it frees our attention for more important things. We will see this principle again and again: *We perceive the world not exactly as it is, but as it is useful for us to perceive it.*

✓ Check Your Understanding

Ask Yourself

- Can you recall a recent time when, your attention focused on one thing, you were oblivious to something else (perhaps to pain, to someone's approach, or to background music)?

Test Yourself

- Explain how Heather Sellers' experience of prosopagnosia illustrates the difference between sensation and perception.
- Explain three attentional principles that magicians may use to fool us.
- Using sound as your example, explain how these concepts differ: *absolute threshold*, *subliminal stimulation*, and *difference threshold*.
- Why is it that after wearing shoes for a while, you cease to notice them?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 16 REVIEW

16-1 What are *sensation* and *perception?* What do we mean by *bottom-up processing* and *top-down processing?*

- *Sensation* is the process by which our sensory receptors and nervous system receive and represent stimulus energies from our environment. *Perception* is the process of organizing and interpreting this information, enabling recognition of meaningful events. Sensation and perception are actually parts of one continuous process.
- *Bottom-up processing* is sensory analysis that begins at the entry level, with information flowing from the sensory receptors to the brain. *Top-down processing* is information processing guided by high-level mental processes, as when we construct perceptions by filtering information through our experience and expectations.

16-2 How does selective attention direct our perceptions?

- We *selectively attend* to, and process, a very limited portion of incoming information, blocking out much and often shifting the spotlight of our attention from one thing to another.
- Focused intently on one task, we often display *inattentional blindness* (including *change blindness*) to other events and changes around us.

16-3 What three steps are basic to all our sensory systems?

- Our senses (1) receive sensory stimulation (often using specialized receptor cells), (2) transform that stimulation into neural impulses, and (3) deliver the neural information to the brain. *Transduction* is the process of converting one form of energy into another.
- Researchers in *psychophysics* study the relationships between stimuli's physical characteristics and our psychological experience of them.

16-4 How do *absolute thresholds* and *difference thresholds* differ?

- Our *absolute threshold* for any stimulus is the minimum stimulation necessary for us to be consciously aware of it 50 percent of the time. *Signal detection theory* predicts how and when we will detect a faint stimulus amid background noise. Individual absolute thresholds vary, depending on the strength of the signal and also on our experience, expectations, motivation, and alertness.
- Our *difference threshold* (also called *just noticeable difference,* or *jnd*) is the minimum stimulus difference we can discern 50 percent of the time. *Weber's law* states that two stimuli must differ by a constant percentage (not a constant amount) to be perceived as different.

16-5 How are we affected by subliminal stimuli?

- *Priming* shows that we can be affected by stimuli so weak that we don't consciously notice them, and we can evaluate a stimulus even when we're not consciously aware of it.
- While we can be primed by subliminal stimuli, however, research indicates that such stimuli cannot persuade us or change our behavior.

16-6 What is the function of sensory adaptation?

- *Sensory adaptation* (our diminished sensitivity to constant odors, sights, sounds, and touches) focuses our attention on informative changes in our environment.

Multiple-Choice Questions

1. As she looks at a face, Jamie is able to recognize it as the face of her mother. Which of the following explains why she can recognize her mother's face?

a. Selective attention

b. Transduction
c. Bottom-up processing
d. Top-down processing
e. Signal detection theory

2. Charles and his wife are at a loud baseball game, yet are able to have a conversation with each other in spite of all the noise around them. Which principle best explains this scenario?

a. Bottom-up processing
b. Weber’s law
c. The cocktail party effect
d. Top-down processing
e. Sensory adaptation

3. As Jeff reads his psychology textbook he is able to convert the light waves into signals that his brain can interpret due to the concept of

a. transduction.
b. perception.
c. priming.
d. signal detection theory.
e. threshold.

4. Natalia is washing her hands, and she adjusts the faucet handle until the water feels just slightly hotter than it did before. Natalia’s adjustment until she feels the change in temperature is an example of

a. a subliminal stimulus.
b. an absolute threshold.
c. a difference threshold.
d. signal detection.
e. perceptual constancy.

5. Tyshane went swimming with friends who did not want to get into the pool because the water felt cold. Tyshane jumped in and after a few minutes declared, “It was cold when I first got in, but now it’s fine. Come on in!” Tyshane’s body became accustomed to the water temperature due to

a. priming.
b. absolute threshold.
c. difference threshold.
d. selective attention.
e. sensory adaptation.

Practice FRQs

1. Explain how the following are involved when you listen to your favorite song:

- Bottom-up processing
- Top-down processing

Answer

1 point: Bottom-up processing will take place in the ear and allow you to hear the individual notes and words of the song. Page 158

1 point: Top-down processing will take place in the brain and allow you to recognize the song as your favorite song. Page 158

2. Marisol is planning a ski trip for winter break. Explain how each of the following might play a role in her perception of the winter weather she will experience:

- Difference threshold
- Absolute threshold
- Selective attention

(3 points)

Module 17 Influences on Perception

LEARNING TARGETS

- 17-1 Analyze the ways in which our expectations, contexts, motivation, and emotions influence our perceptions.
- 17-2 Describe the claims of ESP, and discuss what most research psychologists have concluded after putting these claims to the test.

Perceptual Set

17-1 How do our expectations, contexts, motivation, and emotions influence our perceptions?

To see is to believe. As we less fully appreciate, to believe is to see. Through experience, we come to expect certain results. Those expectations may give us a **perceptual set**, a set of mental tendencies and assumptions that affects, top-down, what we hear, taste, feel, and see.

perceptual set

a mental predisposition to perceive one thing and not another.

Consider: Is the center image in **Figure 17.1** an old or young woman? What we see in such a drawing can be influenced by first looking at either of the two unambiguous versions (Boring, 1930). Likewise, in the figure below Figure 17.1: Reading from left to right, our expectations cause us to perceive the middle script differently than when reading from top to bottom.

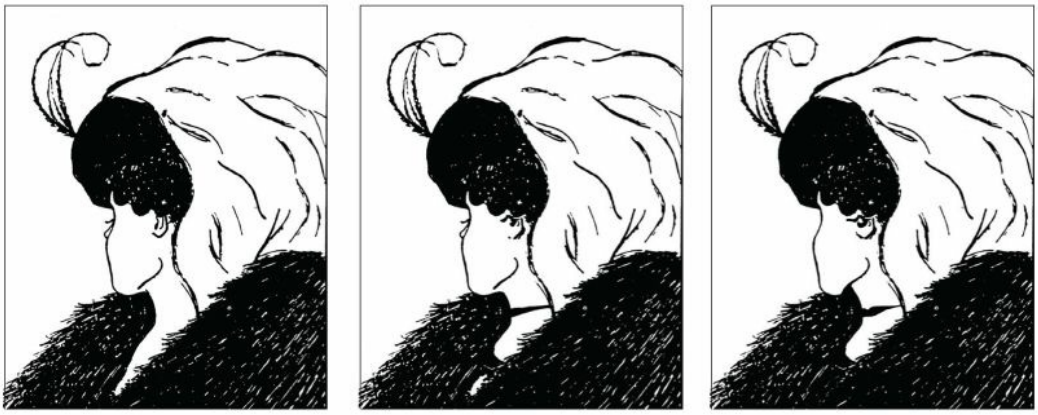
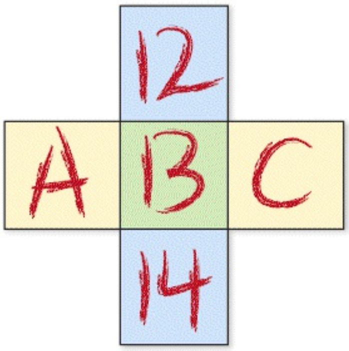


Figure 17.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
W.E. Hill, 1915

Figure 17.1 Perceptual set

Show a friend either the left or right image. Then show the center image and ask, “What do you see?” Whether your friend reports seeing an old woman’s face or young woman’s profile may depend on which of the other two drawings was viewed first. In each of those images, the meaning is clear, and it will establish perceptual expectations.



Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Everyday examples abound of perceptual set—of “mind over mind.” In 1972, a British newspaper published unretouched photographs of a “monster” in Scotland’s Loch Ness—“the most amazing pictures ever taken,” stated the paper. If this information creates in you the same expectations it did in most of the paper’s readers, you, too, will see the monster in a similar photo in **Figure 17.2**. But when a skeptical researcher approached the original photos with different expectations, he saw a curved tree limb—as had others the day that photo was shot (Campbell, 1986). With this different perceptual set, you may now notice that the object is floating motionless, with ripples outward in all directions—hardly what we would expect of a swimming monster.

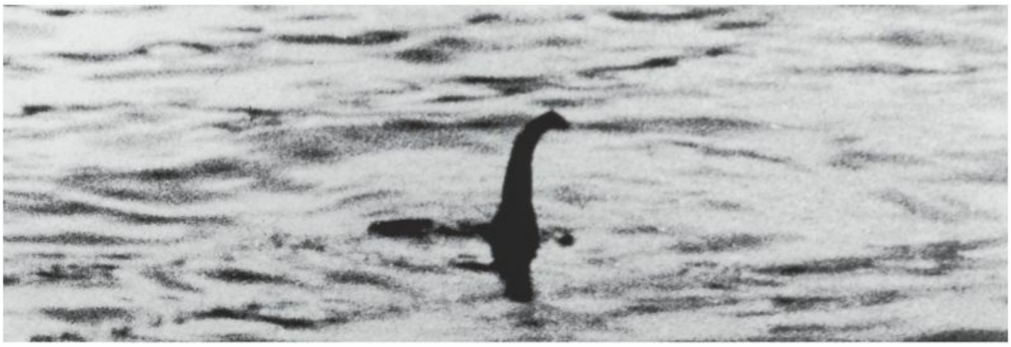


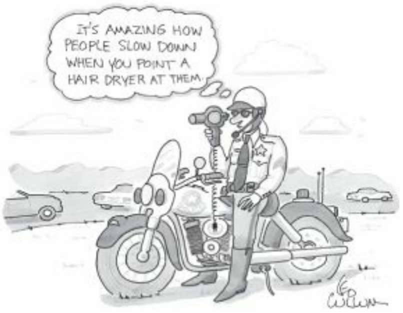
Figure 17.2
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Keystone/Getty Images

Figure 17.2 **Believing is seeing**

What do you perceive? Is this Nessie, the Loch Ness monster, or a log?

To believe is also to hear. Consider the kindly airline pilot who, on a takeoff run, looked over at his sad co-pilot and said, “Cheer up.” Expecting to hear the usual “Gear up,” the co-pilot promptly raised the wheels—before they left the ground (Reason & Mycielska, 1982). The context of spoken words will determine whether you hear “the stuffy nose” or “the stuff he knows.” And depending on your perceptual set, the weather-forecasting “meteorologist” may become a muscular kidney specialist—your “meaty urologist.” Music lovers have recorded thousands of mishearings at kissthisguy.com, a website named for Jimi Hendrix’s oft-misheard phrase “kiss the sky.”

Or consider this odd question: If you said one thing but heard yourself saying another, what would you think you said? To find out, a clever Swedish research team invited people to name a font color, such as saying “gray” when the word *green* was presented in a gray font (Lind et al., 2014). While the participants heard themselves speaking over a noise-cancelling headset, the experimenters occasionally substituted the participant’s own previously recorded voice, such as saying “green” instead of “gray.” Surprisingly, people usually missed the switch—and experienced the inserted word as self-produced. What they heard controlled their perception of what they had just said.


IT'S AMAZING HOW PEOPLE SLOW DOWN WHEN YOU POINT A HAIR DRYER AT THEM.

The New Yorker Collection, 2002, Leo Cullum
from cartoonbank.com

Perceptual set at work.

Our expectations can also influence our taste perceptions. In one experiment, preschool children, by a 6-to-1 margin, thought french fries tasted better when served in a McDonald’s bag rather than a plain white bag (Robinson et al., 2007). Another experiment invited campus bar patrons at the Massachusetts Institute of Technology to sample free beer (Lee et al., 2006). When researchers added a few drops of vinegar to a brand-name beer and called it “MIT brew,” the tasters preferred it—unless they had been told they were drinking vinegar-laced beer. In that case, they expected, and usually experienced, a worse taste.

There
Are Two
Errors in The
The Title Of
This Book

Book by Robert M. Martin, 2011

Did you perceive what you expected in this title—and miss the errors? If you are still puzzled, see the explanation below.[1]

What determines our perceptual set? As Module 47 will explain, through experience we form concepts, or *schemas*, that organize and interpret unfamiliar information. Our preexisting schemas for monsters and tree trunks influence how we apply top-down processing to interpret ambiguous sensations.

In everyday life, stereotypes about gender (another instance of perceptual set) can color perception. Without the obvious cues of pink or blue, people will struggle over whether to call the new baby “he” or “she.” But told an infant is “David,” people (especially children) have perceived “him” as bigger and stronger than when the same infant was called “Diana” (Stern & Karraker, 1989). Some differences, it seems, exist merely in the eyes of their beholders.

Context, Motivation, and Emotion

Perceptual set influences how we interpret stimuli. But our immediate context, and the motivation and emotion we bring to a situation, also affect our interpretations.

Context

Social psychologist Lee Ross invited us to recall our own perceptions in different contexts: “Ever notice that when you’re driving you hate pedestrians, the way they saunter through the crosswalk, almost daring you to hit them, but when you’re walking you hate drivers?” (Jaffe, 2004).

Some other examples of the power of context:

- When holding a gun, people become more likely to perceive another person as also gun-toting—a phenomenon that has led to the shooting of some unarmed people who were actually holding their phone or wallet (Witt & Brockmole, 2012).
- Imagine hearing a noise interrupted by the words “eel is on the wagon.” Likely, you would actually perceive the first word as *wheel*. Given “eel is on the orange,” you would more likely hear *peel*. In each case, the context creates an expectation that, top-down, influences our perception of a previously heard phrase (Grossberg, 1995).
- Cultural context helps inform our perceptions, so it’s not surprising that people from different cultures view things differently, as in **Figure 17.3**.
- How tall is the shorter player in **Figure 17.4**?
- And how is the woman in **Figure 17.5** feeling? The context provided in **Figure 17.6** will leave no doubt.

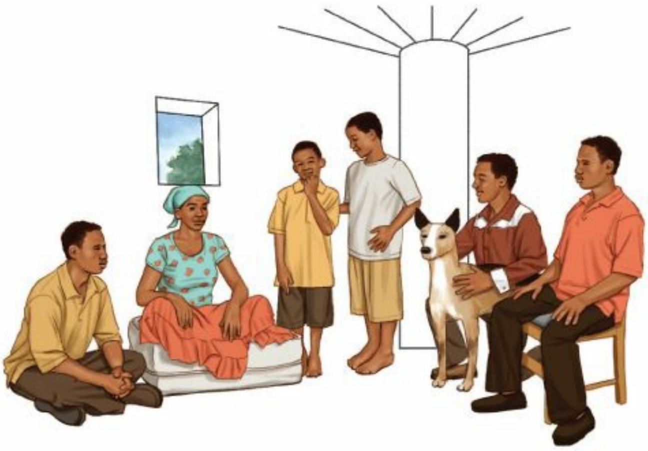


Figure 17.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 17.3 Culture and context effects

What is above the woman's head? In one classic study, most rural East Africans questioned said the woman was balancing a metal box or can on her head (a typical way to carry water at that time). They also perceived the family as sitting under a tree. Westerners, used to running water and box-like houses with corners, were more likely to perceive the family as being indoors, with the woman sitting under a window (Gregory & Gombrich, 1973).

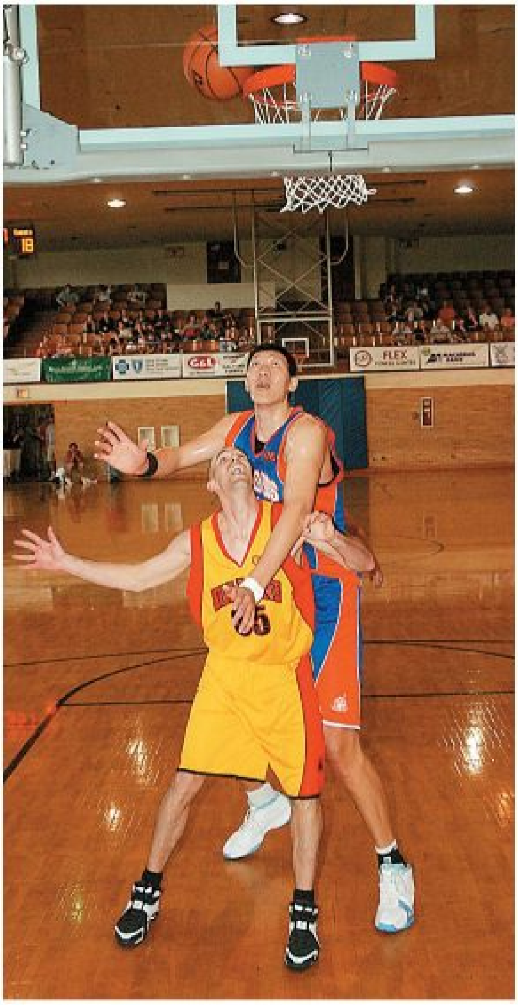


Figure 17.4
Dennis Goeppert/Holland Sentinel

Figure 17.4 Big and "little"

The "little guy" shown here is actually a 6'9'' former Hope College basketball center who would tower over most of us. But he seemed like a short player when matched in a semi-pro game against the world's tallest basketball player at that time, 7'9'' Sun Ming Ming from China.

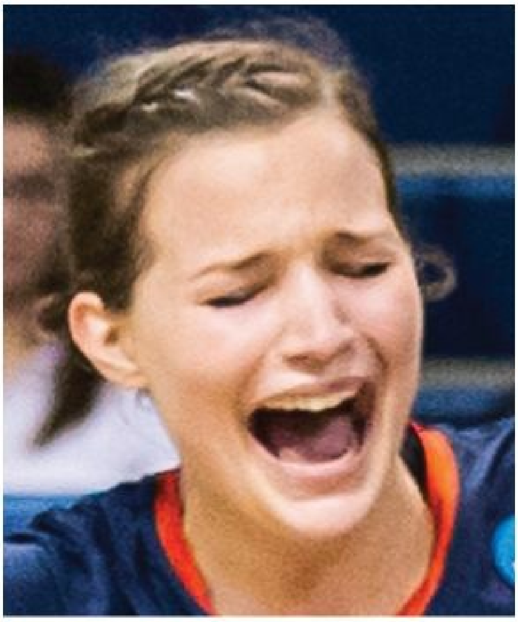


Figure 17.5
Craig Klomparens/Hope College

Figure 17.5 What emotion is this?

(See Figure 17.6.)

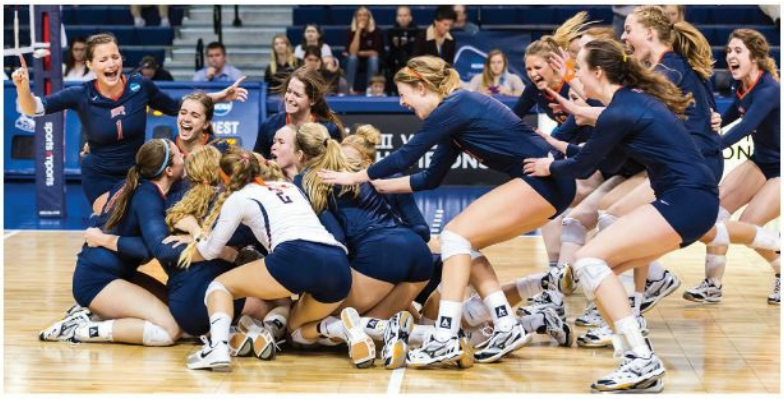


Figure 17.6
Craig Klomparens/Hope College

Figure 17.6 Context makes clearer

The Hope College volleyball team celebrates its national championship winning moment.

Motivation

Motives give us energy as we work toward a goal. Like context, they can bias our interpretations of neutral stimuli. Consider these findings:

- Desirable objects, such as a water bottle viewed by a thirsty person, seem closer than they really are (Balcetis & Dunning, 2010). This perceptual bias energizes our going for it.

- A to-be-climbed hill can seem steeper when we are carrying a heavy backpack, and a walking destination further away when we are feeling tired (Burrow et al., 2016; Philbeck & Witt, 2015; Proffitt 2006a,b). Going on a diet can lighten our biological "backpack" (Taylor-Covill & Eves, 2016). When heavy people lose weight, hills and stairs no longer seem so steep.
- A softball appears bigger when you're hitting well, as researchers observed after asking players to choose a circle the size of the ball they had just hit well or poorly. There's also a reciprocal phenomenon: Seeing a target as bigger—as happens when athletes focus directly on a target—improves performance (Witt et al., 2012).

Emotion

Other clever experiments have demonstrated that emotions can shove our perceptions in one direction or another.

- Hearing sad music can predispose people to perceive a sad meaning in spoken homophonic words—*mourning* rather than *morning*, *die* rather than *dye*, *pain* rather than *pane* (Halberstadt et al., 1995).
- When angry, people more often perceive neutral objects as guns (Baumann & DeSteno, 2010).
- When mildly upset by subliminal exposure to a scowling face, people perceive a neutral face as less attractive and likeable (Anderson et al., 2012).

Emotions and motives color our *social* perceptions, too. People more often perceive solitary confinement, sleep deprivation, and cold temperatures as "torture" when experiencing a small dose of such themselves (Nordgren et al., 2011). Spouses who feel loved and appreciated perceive less threat in stressful marital events—"He's just having a bad day" (Murray et al., 2003).

The moral of all these examples? *Much of what we perceive comes not* *just from what's "out there," but also from what's behind our eyes and between our ears.* Through top-down processing, our experiences, assumptions, expectations—and even our context, motivation, and emotions—can shape and color our views of reality.

ESP—Perception Without Sensation?

17-2 What are the claims of ESP, and what have most research psychologists concluded after putting these claims to the test?

The river of perception is fed by sensation, cognition, and emotion. If perception is the product of these three sources, what can we say about **extrasensory perception (ESP),** which claims that perception can occur apart from sensory input? Are there indeed people—any people—who can read minds, see through walls, or foretell the future? Nearly half of Americans have agreed there are (AP, 2007; Moore, 2005).

extrasensory perception (ESP)

the controversial claim that perception can occur apart from sensory input; includes telepathy, clairvoyance, and precognition.

If ESP is real, we would need to overturn the scientific understanding that we are creatures whose minds are tied to our physical brains and whose perceptual experiences of the world are built of sensations. The most testable and, for this discussion, most relevant ESP claims are

- *telepathy:* mind-to-mind communication.
- *clairvoyance:* perceiving remote events, such as a house on fire in another state.
- *precognition:* perceiving future events, such as an unexpected death in the next month.

Closely linked is *psychokinesis*, or “mind moving matter,” such as levitating a table or influencing the roll of a die. (The claim, also called *telekinesis*, is illustrated by the wry request, “Will all those who believe in psychokinesis please raise my hand?”)

Most research psychologists and scientists have been skeptical that paranormal phenomena exist. But in several reputable universities,

parapsychology researchers perform scientific experiments searching for possible ESP phenomena (Storm et al., 2010a,b; Turpin, 2005). Before seeing how they conduct their research, let's consider some popular beliefs.

parapsychology

the study of paranormal phenomena, including ESP and psychokinesis.

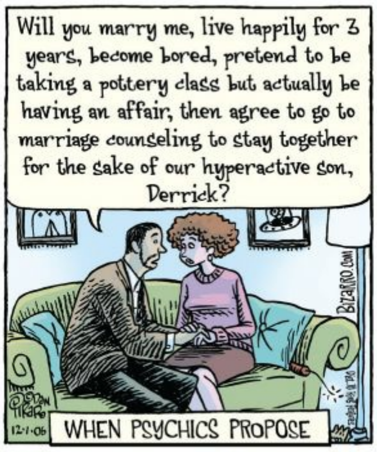
Premonitions or Pretensions?

Can psychics see into the future? Although one might wish for a psychic stock forecaster, the tallied forecasts of "leading psychics" reveal meager accuracy. During the 1990s, the tabloid psychics were all wrong in predicting surprising events. (Madonna did not become a gospel singer, the Statue of Liberty did not lose both its arms in a terrorist blast, Queen Elizabeth did not abdicate her throne to enter a convent.) And the psychics have missed big-news events. Where were the psychics on 9/10 when we needed them? Why, despite a $50 million reward, could no psychics help locate Osama bin Laden after 9/11? And why, when the Chilean government consulted four psychics after a mine collapse trapped 33 miners in 2010, did those psychics sorrowfully decide "They're all dead" (Kraul, 2010)? Imagine their surprise when all 33 miners were rescued 69 days later.

After Amanda Berry went missing in Cleveland in 2003, her distraught and desperate mother turned to a famed TV psychic detective for answers. "She's not alive, honey," the psychic told the devastated mom, who died without living to see her daughter rescued in 2013 (Radford, 2013). According to one analysis, this result brought that psychic's record on 116 missing person and death cases to 83 unknown outcomes, 33 incorrect, and zero mostly correct. To researcher Ryan Shaffer (2013), that's the record of a "psychic defective."

The psychic visions offered to police departments have been no more accurate than guesses made by others (Nickell, 1994, 2005; Radford, 2010;

Reiser, 1982). But their sheer volume does increase the odds of an occasional correct guess, which psychics can then report to the media. Such visions can sound amazingly correct when later retrofitted to match events. Nostradamus, a sixteenth-century French psychic, explained in an unguarded moment that his ambiguous prophecies “could not possibly be understood till they were interpreted after the event and by it.”


Will you marry me, live happily for 3 years, become bored, pretend to be taking a pottery class but actually be having an affair, then agree to go to marriage counseling to stay together for the sake of our hyperactive son, Derrick?
WHEN PSYCHICS PROPOSE
BIZARRO.com
Dan Piraro
12-1-06

BIZARRO © 2014 Dan Piraro, Dist. By King Features

Are everyday people’s “visions” any more accurate than the psychics’ predictions? Do our dreams foretell the future, or do they only seem to do so when we recall or reconstruct them in light of what has already happened? Are our remembered visions merely revisions? After famed aviator Charles Lindbergh’s baby son was kidnapped and murdered in 1932, but before the body was discovered, two Harvard psychologists invited people to report their dreams about the child (Murray & Wheeler, 1937). How many visionaries replied? 1300. How many accurately envisioned the child dead? Five percent. How many also correctly anticipated the body’s location—buried among trees? Only four. Although this number was surely no better than chance, to those four dreamers, the accuracy of their apparent precognitions must have seemed uncanny.

> “*To be sure of hitting the target, shoot first and call whatever you hit the target.*”
>
> *Writer-artist Ashleigh Brilliant*

Given the countless events in the world each day, and given enough days, some stunning coincidences are bound to occur. By one careful estimate, chance alone would predict that more than a thousand times per day, someone on Earth will think of another person and then, within the next five minutes, learn of that person's death (Charpak & Broch, 2004). Thus, when explaining an astonishing event, we should "give chance a chance" (Lilienfeld, 2009). With enough time and people, the improbable becomes inevitable.

> "*A person who talks a lot is sometimes right.*"
>
> *Spanish proverb*

Putting ESP to Experimental Test

When faced with claims of mind reading or out-of-body travel or communication with the dead, how can we separate fiction from strange-but-true fact? At the heart of science is a simple answer: *Test them to see if they work.* If they do, so much the better for the ideas. If they don't, so much the better for our skepticism.

Both believers and skeptics agree that what parapsychology needs is a reproducible phenomenon and a theory to explain it. Parapsychologist Rhea White (1998) spoke for many in saying that "the image of parapsychology that comes to my mind, based on nearly 44 years in the field, is that of a small airplane [that] has been perpetually taxiing down the runway of the Empirical Science Airport since 1882 . . . its movement punctuated occasionally by lifting a few feet off the ground only to bump back down on the tarmac once again. It has never taken off for any sustained flight."

How might we test ESP claims in a controlled, reproducible experiment? An experiment differs from a staged demonstration. In the laboratory, the experimenter controls what the "psychic" sees and hears. On stage, the psychic controls what the audience sees and hears.

Mind Machine
Mind Machine
Mind Machine

Courtesy of Claire Cole

Testing psychic powers in the British population Psychologists created a “mind machine” to see if people could influence or predict a coin toss (Wiseman & Greening, 2002). Using a touch-sensitive screen, visitors to British festivals were given four attempts to call heads or tails, playing against a computer that kept score. By the time the experiment ended, nearly 28,000 people had predicted 110,959 tosses—with 49.8 percent correct.

Daryl Bem, a respected social psychologist, once quipped that “a psychic is an actor playing the role of a psychic” (1984). Yet this one-time skeptic reignited hopes for replicable evidence of ESP with nine experiments that seemed to show people anticipating future events (Bem, 2011). In one, when an erotic scene was about to appear on a screen in one of two randomly selected positions, Cornell University participants guessed the right placement 53.1 percent of the time (beating 50 percent by a small but statistically significant margin). Bem wondered if his “anomalous” findings reflected an evolutionary advantage to those who can precognitively anticipate future events.

Despite the paper having survived critical reviews by a top-tier journal, critics scoffed. Some found the methods “badly flawed” (Alcock, 2011) or the statistical analyses “biased” (Wagenmakers et al., 2011). Others predicted the results could not be replicated by “independent and skeptical researchers” (Helfand, 2011). And still others had more sweeping objections: “If any of his claims were true,” wrote one cognitive scientist, “then all of the bases underlying contemporary science would be toppled, and we would have to rethink everything about the nature of the universe” (Hofstadter, 2011).

Anticipating such skepticism, Bem has made his research materials available to anyone who wishes to replicate his studies. Multiple attempts have met with minimal success and continuing controversy (Bem et al., 2014; Galak et al., 2012; Ritchie et al., 2012; Wagenmakers, 2014). Regardless, science is doing its work:

- It has been open to a finding that challenges its own assumptions.
- Through follow-up research, it has assessed the validity of that finding.

And that is how science sifts crazy-sounding ideas, leaving most on the historical waste heap while occasionally surprising us.

> “*At the heart of science is an essential tension between two seemingly contradictory attitudes—an openness to new ideas, no matter how bizarre or counterintuitive they may be, and the most ruthless skeptical scrutiny of all ideas, old and new.*”
>
> *Carl Sagan (1987)*

For nineteen years, one skeptic, magician James Randi, offered $1 million “to anyone who proves a genuine psychic power under proper observing conditions” (Randi, 1999; Thompson, 2010). French, Australian, and Indian groups have made similar offers (CFI, 2003). Large as these sums are, the scientific seal of approval would be worth far more. To refute those who say there is no ESP, one need only produce a single person who can demonstrate a single, reproducible ESP event. (To refute those who say pigs can’t talk would take but one talking pig.) So far, no such person has emerged.

✓ Check Your Understanding

Ask Yourself

- Can you recall a time when your expectations have predisposed how you perceived a person or group—perhaps at school, work, or in your community?

Test Yourself

- What type of evidence shows that, indeed, “there is more to perception than meets the senses”?
- Does *perceptual set* involve bottom-up or top-down processing? Why?
- If an ESP event occurred under controlled conditions, what would be the next best step to confirm that ESP really exists?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 17 REVIEW

17-1 How do our expectations, contexts, motivation, and emotions influence our perceptions?

- *Perceptual set* is a mental predisposition that functions as a lens through which we perceive the world.
- Our learned concepts (schemas) prime us to organize and interpret ambiguous stimuli in certain ways.
- Our motivation, as well as our physical and emotional context, can create expectations and color our interpretation of events and behaviors.

17-2 What are the claims of ESP, and what have most research psychologists concluded after putting these claims to the test?

- *Parapsychology* is the study of paranormal phenomena, including *extrasensory perception (ESP)* and psychokinesis.
- The three most testable forms of ESP are telepathy (mind-to-mind communication), clairvoyance (perceiving remote events), and precognition (perceiving future events).
- Skeptics argue that (1) to believe in ESP, you must believe the brain is capable of perceiving without sensory input, and (2) researchers have been unable to replicate ESP phenomena under controlled conditions.

Multiple-Choice Questions

1. Tonya’s psychology teacher played some backwards music to the class, and they were not able to make out any words or phrases in the selection. When the teacher told them to listen for the words “The rat ate the cat” when she played it again, most of the class now heard the words. Which principle explains this experience?

a. A context effect

b. Perceptual set
c. Extrasensory perception
d. Selective attention
e. Weber's law

2. On a warm summer day, Kimberly tells her brother to put on a suit. Kimberly's brother knows to put on a swimsuit instead of a business suit because of

a. context.
b. priming.
c. sensory adaptation.
d. bottom-up processing.
e. clairvoyance.

3. A famous psychic is a YouTube sensation because of his ability to read the minds of people in the audience at his shows. Which type of psychic power would he claim?

a. Precognition
b. Psychokinesis
c. Clairvoyance
d. Telepathy
e. Bottom-up processing

Practice FRQs

1. Martha is convinced she has extrasensory perception. Explain the specific abilities Martha would display if she had each of the following forms of ESP:

- Telepathy
- Clairvoyance
- Precognition

Then briefly explain why you should doubt her claims.

Answer

1 point: Telepathy: Martha would be able to use mind-to-mind communication. For example, she may know what someone in another room is thinking. Page 172

1 point: Clairvoyance: Martha would be able to perceive things happening at a distance. For example, she may know that her cousin who lives in another state has just burned her hand on the oven. Page 172

1 point: Precognition: Martha would be able to see future events happen. For example, she may know that a pop quiz will take place next week. Page 172

1 point: There has never been a conclusive scientific demonstration of extrasensory ability. Page 173

2. David has just witnessed a robbery at his bank. Explain how the following can affect his perceptions of the robbery:

- Context effects
- Emotions
- Motivations

(3 points)

Module **18 Vision: Sensory and Perceptual Processing**

LEARNING TARGETS

- 18-1 Discuss the characteristics of the energy that we see as visible light, and describe the structures in the eye that help focus that energy.
- 18-2 Describe how the rods and cones process information, and explain the path information travels from the eye to the brain.
- 18-3 Discuss how we perceive color in the world around us.
- 18-4 Describe the location and function of feature detectors.
- 18-5 Explain how the brain uses parallel processing to construct visual perceptions.

Light Energy and Eye Structures

18-1 What are the characteristics of the energy that we see as visible light? What structures in the eye help focus that energy?

Our eyes receive light energy and *transduce* (transform) it into neural messages. From this neural input, our brain—in one of life's greatest wonders—then creates what we consciously see. How does such a taken-for-granted yet extraordinary thing happen?

The Stimulus Input: Light Energy

When you look at a bright red tulip, the stimuli striking your eyes are not particles of the color red, but pulses of electromagnetic energy that your visual system *perceives* as red. What we see as visible light is but a thin slice of the wide spectrum of electromagnetic energy shown in **Figure 18.1**. On the spectrum's one end are the short gamma waves, no longer than the diameter of an atom. On the other end are the mile-long waves of radio transmission. In between is the narrow band visible to us. Other portions are visible to other animals. Bees, for instance, cannot see what we perceive as red but can see ultraviolet light.

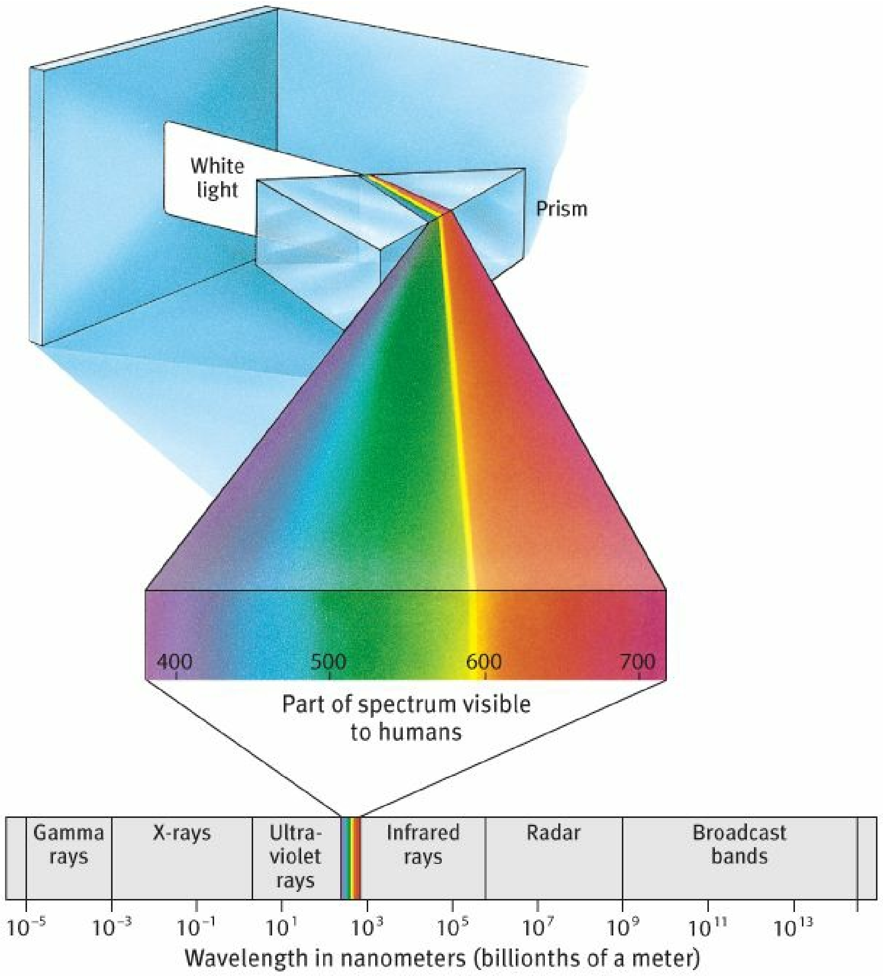

White light
Prism
400
500
600
700
Part of spectrum visible to humans
Gamma rays
X-rays
Ultra-violet rays
Infrared rays
Radar
Broadcast bands
10^{-5}
10^{-3}
10^{-1}
10^{1}
10^{3}
10^{5}
10^{7}
10^{9}
10^{11}
10^{13}
Wavelength in nanometers (billionths of a meter)

Figure 18.1
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Figure 18.1 The wavelengths we see

What we see as light is only a tiny slice of a wide spectrum of electromagnetic energy, which ranges from gamma rays as short as the diameter of an atom to radio waves over a mile long. The wavelengths visible to the human eye (shown enlarged) extend from the shorter waves of blue-violet light to the longer waves of red light.

Light travels in waves, and the shape of those waves influences what we see. Light's **wavelength** is the distance from one wave peak to the next (**Figure 18.2a**). Wavelength determines **hue,** the color we experience, such as the tulip's red petals or green leaves. A light wave's *amplitude,* or height, determines its **intensity**—the amount of energy the wave contains. Intensity influences brightness (**Figure 18.2b**).

wavelength

the distance from the peak of one light or sound wave to the peak of the next. Electromagnetic wavelengths vary from the short blips of gamma rays to the long pulses of radio transmission.

hue

the dimension of color that is determined by the wavelength of light; what we know as the color names *blue*, *green*, and so forth.

intensity

the amount of energy in a light wave or sound wave, which influences what we perceive as brightness or loudness. Intensity is determined by the wave's amplitude (height).

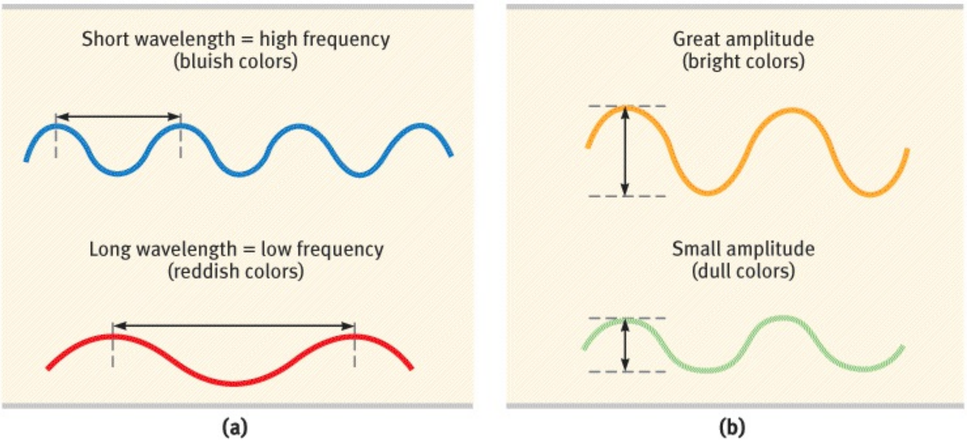
Short wavelength = high frequency
(bluish colors)
Long wavelength = low frequency
(reddish colors)
Great amplitude
(bright colors)
Small amplitude
(dull colors)
(a)
(b)

Figure 18.2
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Figure 18.2 The physical properties of waves

(a) Waves vary in *wavelength* (the distance between successive peaks). *Frequency*, the number of complete wavelengths that can pass a point in a given time, depends on the wavelength. The shorter the wavelength, the higher the frequency. Wavelength determines the perceived *color* of light. (b) Waves also vary in *amplitude* (the height from peak to trough). Wave amplitude influences the perceived *brightness* of colors.

To understand *how* we transform physical energy into color and meaning, we need to know more about vision's window—the eye.

The Eye

Light enters the eye through the **cornea**, which bends light to help provide focus (Figure 18.3). The light then passes through the **pupil**, a small adjustable opening. Surrounding the pupil and controlling its size is the **iris**, a colored muscle that dilates or constricts in response to light intensity. Each iris is so distinctive that an iris-scanning machine can confirm your identity.

cornea

the eye's clear, protective outer layer, covering the pupil and iris.

pupil

the adjustable opening in the center of the eye through which light enters.

iris

a ring of muscle tissue that forms the colored portion of the eye around the pupil and controls the size of the pupil opening.

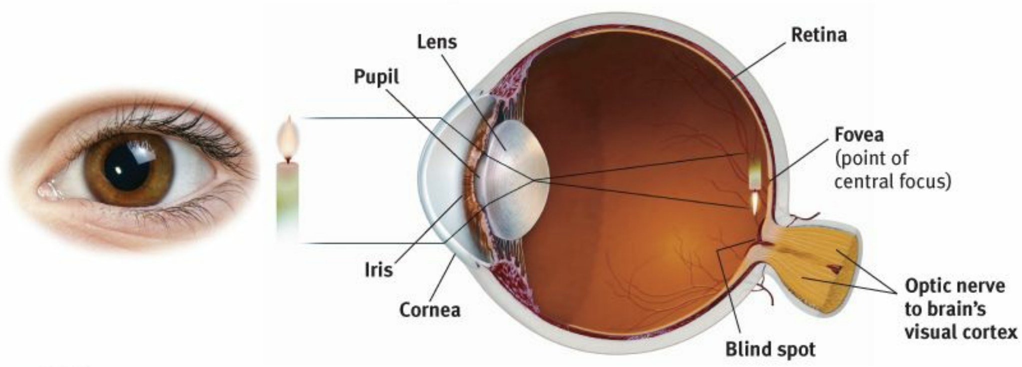

Figure 18.3
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Pascal Goetgheluck/Science Source

Figure 18.3 The eye

Light rays reflected from a candle pass through the cornea, pupil, and lens. The curvature and thickness of the lens change to bring nearby or distant objects into focus on the retina. Rays from the top of the candle strike the bottom of the retina, and those from the left side of the candle strike the right side of the retina. The candle’s image on the retina thus appears upside down and reversed.

The iris responds to your cognitive and emotional states. Imagine a sunny sky and your iris will constrict, making your pupil smaller; imagine a dark room and it will dilate (Laeng & Sulutvedt, 2014). The iris also constricts when you are about to answer *No* to a question, or when you feel disgust (de Gee et al., 2014; Goldinger & Papesh, 2012). And when you’re feeling amorous, your telltale dilated pupils and dark eyes subtly signal your interest.

After passing through your pupil, light hits the transparent **lens** in your eye. The lens then focuses the light rays into an image on your **retina,** a multilayered tissue on the eyeball’s sensitive inner surface. To focus the rays, the lens changes its curvature and thickness in a process called **accommodation.** If the lens focuses the image on a point in front of the retina, you see near objects clearly but not distant objects. This nearsightedness—*myopia*—can be remedied with glasses, contact lenses, or surgery.

lens

the transparent structure behind the pupil that changes shape to help focus images on the retina.

retina

the light-sensitive inner surface of the eye, containing the receptor rods and cones plus layers of neurons that begin the processing of visual information.

accommodation

the process by which the eye’s lens changes shape to focus near or far objects on the retina.

For centuries, scientists knew that an image of a candle passing through a small opening will cast an inverted mirror image on a dark wall behind. If the image passing through the pupil casts this sort of upside-down image on the retina, as in Figure 18.3, how can we see the world right side up? The ever-curious Leonardo da Vinci had an idea: Perhaps the eye's watery fluids bend the light rays, reinverting the image to an upright position as it reaches the retina. Unfortunately for da Vinci, that idea was disproved in 1604, when the astronomer and optics expert Johannes Kepler showed that the retina *does* receive upside-down images of the world (Crombie, 1964). So how could we understand such a world? "I leave it," said the befuddled Kepler, "to natural philosophers."

Today's answer: The retina doesn't "see" a whole image. Rather, its millions of receptor cells convert particles of light energy into neural impulses and forward those to the brain, which reassembles them into what we perceive as an upright-seeming image. And along the way, visual information processing percolates through progressively more abstract levels. The process is rather like taking a house apart and, with countless specialized workers, rebuilding it elsewhere. That all of this happens continuously and effortlessly is better than cool: It is awe-inspiring.

Moreover, it happens with astonishing speed. Consider: As a baseball pitcher's fastball approaches home plate, the light signals work their way from the batter's retina to the visual cortex, which then informs the motor cortex, which then sends out orders to contract the muscles—all within the 4/10ths of a second that the ball is in flight.

Information Processing in the Eye and Brain

Flip It Video: Rods and Cones in the Retina

18-2 How do the rods and cones process information, and what is the path information travels from the eye to the brain?

AP® EXAM TIP

There's a lot of vocabulary here. Make sure you understand the name and the function of each part of the eye. To learn how all the parts fit together, it may help to make rough sketches (you don't need to be an artist to try this!) and then compare your sketches with Figures 18.3 and 18.4. You'll be better off making several quick, rough sketches than one time-consuming, nicely drawn one.

The Eye-to-Brain Pathway

Imagine that you could follow a single light-energy particle after it entered your eye. First, you would thread your way through the retina's sparse outer layer of cells. Then, reaching the back of your eye, you would encounter the retina's nearly 130 million buried receptor cells, the **rods** and **cones** (**Figure 18.4**). There, you would see the light energy trigger chemical changes. That chemical reaction would spark neural signals in nearby *bipolar cells.* You could then watch the bipolar cells activate neighboring *ganglion cells,* whose axons twine together like the strands of a rope to form the **optic nerve.** After a momentary stopover at the thalamus, the information would fly on to the final destination, your visual cortex, in the occipital lobe at the back of your brain.

rods

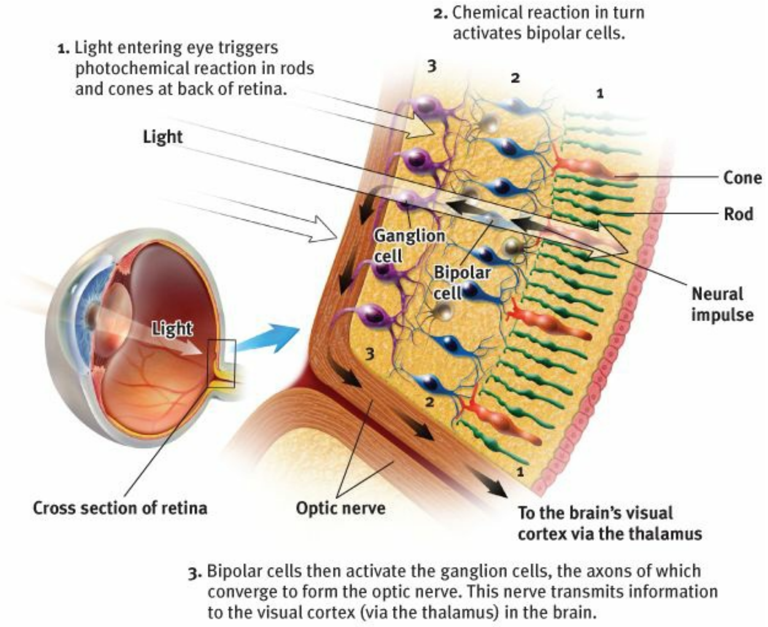
retinal receptors that detect black, white, and gray, and are sensitive to movement; necessary for peripheral and twilight vision, when cones don't respond.

cones

retinal receptors that are concentrated near the center of the retina and that function in daylight or in well-lit conditions. Cones detect fine detail and give rise to color sensations.

optic nerve

the nerve that carries neural impulses from the eye to the brain.



2. Chemical reaction in turn activates bipolar cells.
1. Light entering eye triggers photochemical reaction in rods and cones at back of retina.
3
2
1
Light
Cone
Rod
Ganglion cell
Bipolar cell
Neural impulse
Light
3
2
1
Cross section of retina
Optic nerve
To the brain's visual cortex via the thalamus
3. Bipolar cells then activate the ganglion cells, the axons of which converge to form the optic nerve. This nerve transmits information to the visual cortex (via the thalamus) in the brain.

Figure 18.4

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Figure 18.4 The retina's reaction to light

The optic nerve is an information highway from the eye to the brain. This nerve can send nearly 1 million messages at once through its nearly 1 million ganglion fibers. (The auditory nerve, which enables hearing, carries much less information through its mere 30,000 fibers.) We pay a small price for this high-speed connection, however. Your eye has a **blind spot**, an area with no receptor cells, where the optic nerve leaves the eye (**Figure 18.5**). Close one eye and you won't see a black hole, however. Without seeking your approval, your brain fills in the hole.

blind spot

the point at which the optic nerve leaves the eye, creating a “blind” spot because no receptor cells are located there.

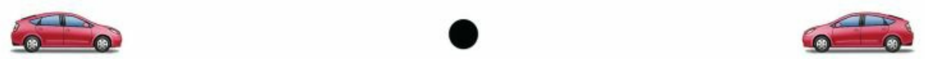

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Figure 18.5 The blind spot

There are no receptor cells where the optic nerve leaves the eye. This creates a blind spot in your vision. To demonstrate, close your left eye, look at the spot, and move your face away until one of the cars disappears. (Which one do you predict it will be?) Repeat with your right eye closed—and note that now the other car disappears. Can you explain why?[1]

Rods and cones are our eyes’ light-sensitive *photoreceptors*. They differ in where they’re found and in what they do (**Table 18.1**). *Cones* cluster in and around the **fovea,** the retina’s area of central focus (Figure 18.3). Many cones have their own hotline to the brain: One cone transmits its message to a single bipolar cell, which relays the message to the visual cortex (where a large area receives input from the fovea). These direct connections preserve the cones’ precise information, making them better able to detect fine detail. Although cones can detect white, they also enable you to perceive color (Sabesan et al., 2016). But in dim light, they become unresponsive, so you see no colors.

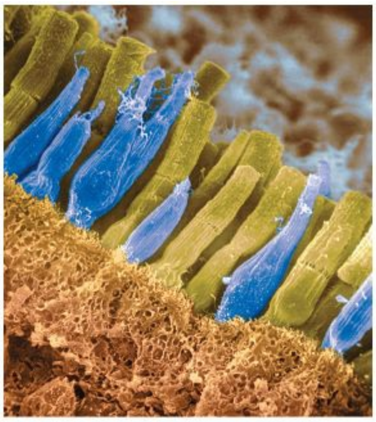
TABLE 18.1 Receptors in the Human Eye: Rod-Shaped Rods and Cone-Shaped Cones

	Cones	**Rods**
Number	6 million	120 million
Location in retina	Center	Periphery
Sensitivity in dim light	Low	High

Color sensitivity	High	Low
Detail sensitivity	High	Low

fovea

the central focal point in the retina, around which the eye's cones cluster.



Omikron/Science Source

Unlike cones, which cluster in the center of your retina, *rods* are located around the retina's outer regions. Rods remain sensitive in dim light, and they enable black-and-white vision. Rods have no hotline to the brain. If cones are soloists, rods perform as a chorus. Several rods pool their faint energy output and funnel it onto a single bipolar cell, which sends the combined message to your brain.

Cones and rods each provide a special sensitivity—cones to detail and color, and rods to faint light and peripheral motion. Stop for a minute and experience this rod-cone difference. Pick a word in this sentence and stare directly at it, focusing its image on the cones in your fovea. Notice that words a few inches off to the side appear blurred? They lack detail because their image is striking your retina's outer regions, where rods predominate. Thus, when driving or biking, rods help you detect a car in your peripheral vision well before you perceive its details. And in **Figure 18.6**, which has 12 black dots, you can see barely two at a time, with your brain filling in the less distinct peripheral input (Kitaoka, 2016, adapting Ninio & Stevens, 2000).

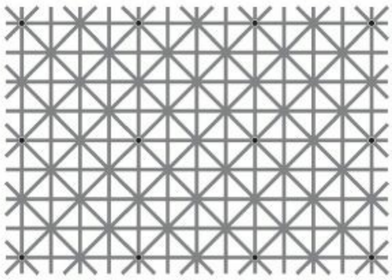


Figure 18.6
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Akiyoshi Kitaoka

Figure 18.6 How many dots do you see at once?

Look at or near any of the twelve black dots and you can see them, but not in your peripheral vision.

When you enter a darkened theater or turn off the light at night, your pupils dilate to allow more light to reach your retina. Your eyes adapt, but fully adapting typically takes 20 minutes or more. This period of dark adaptation matches the average natural twilight transition between the Sun's setting and darkness. How wonderfully made we are.

At the entry level, the retina's neural layers don't just pass along electrical impulses; they also help to encode and analyze sensory information. (The third neural layer in a frog's eye, for example, contains those "bug detector" cells that fire only in response to moving fly-like stimuli.) In human eyes, any given retinal area relays its information to a corresponding location in your visual cortex, in the occipital lobe at the back of your brain (**Figure 18.7**).

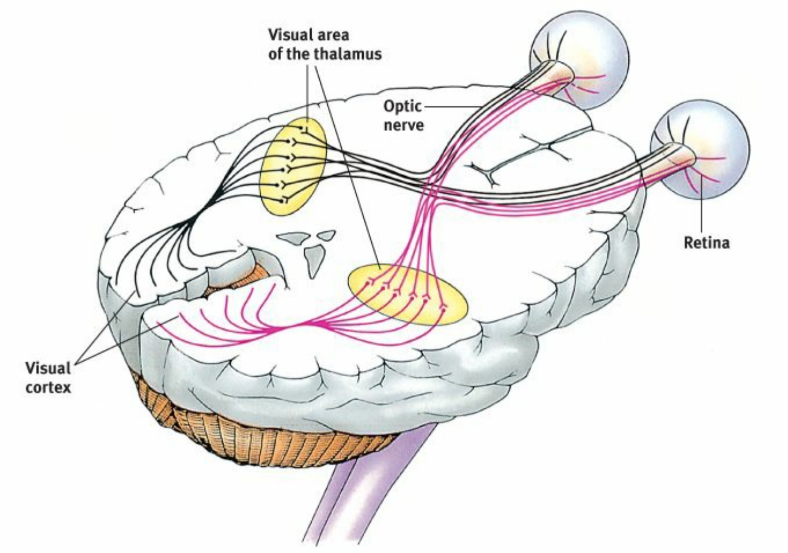

Figure 18.7
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Figure 18.7 Pathway from the eyes to the visual cortex

Ganglion axons forming the optic nerve run to the thalamus, where they synapse with neurons that run to the visual cortex.

The same sensitivity that enables retinal cells to fire messages can lead them to misfire, as you can demonstrate. Turn your eyes to the left, close them, and then gently rub the right side of your right eyelid with your fingertip. Note the patch of light to the left, moving as your finger moves.

Why do you see light? Why at the left? This happens because your retinal cells are so responsive that even pressure triggers them. But your brain interprets their firing as light. Moreover, it interprets the light as coming from the left—the normal direction of light that activates the right side of the retina.

✓ Check Your Understanding

Ask Yourself

- Consider your activities in the last hour. Which of them relied on your rods? Which relied on your cones? How would these activities be different—or impossible—without these cells' different abilities?

Test Yourself

- Some nocturnal animals, such as toads, mice, rats, and bats, have impressive night vision thanks to having many more _______________ (rods/cones) than _______________ (rods/cones) in their retinas. These creatures probably have very poor _______________ (color/black-and-white) vision.
- Cats are able to open their _______________ much wider than we can, which allows more light into their eyes so they can see better at night.

Kruglov_Orda/Shutterstock

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Color Processing

18-3 How do we perceive color in the world around us?

We talk as though objects possess color: “A tomato is red.” Recall the old question, “If a tree falls in the forest and no one hears it, does it make a sound?” We can ask the same of color: If no one sees the tomato, is it red?

The answer is *No*. First, the tomato is everything *but* red, because it *rejects* (reflects) the long wavelengths of red. Second, the tomato’s color is our mental construction. As Sir Isaac Newton (1704) noted, “The [light] rays are not colored.” Like all aspects of vision, our perception of color resides not in the object itself but in the theater of our brain, as illustrated by our dreaming in color.

> “*Only mind has sight and hearing; all things else are deaf and blind.*”
>
> *Epicharmus*, Fragments, *550* B.C.E.

One of vision’s most basic and intriguing mysteries is how we see the world in color. How, from the light energy striking the retina, does our brain construct our experience of such a multitude of colors?

Modern detective work on the mystery of color vision began in the nineteenth century, when Hermann von Helmholtz built on the insights of an English physicist, Thomas Young. They knew that any color can be created by combining the light waves of three primary colors—red, green, and blue. So Young and von Helmholtz formed a hypothesis: The eye must therefore have three corresponding types of color receptors.

Years later, researchers confirmed the **Young-Helmholtz trichromatic (three-color) theory.** By measuring the response of various cones to different color stimuli, they confirmed that the retina does indeed have three types of color receptors, each especially sensitive to the wavelengths of red, green, or blue. When light stimulates combinations of these cones, we see other colors. For example, the retina has no separate receptors especially sensitive to yellow. But when red and green wavelengths stimulate both red-sensitive and green-sensitive cones, we see yellow.

Young-Helmholtz trichromatic (three-color) theory

the theory that the retina contains three different types of color receptors—one most sensitive to red, one to green, one to blue—which, when stimulated in combination, can produce the perception of any color.

By one estimate, we can see differences among more than 1 million color variations (Neitz et al., 2001). At least most of us can. About 1 person in 50 is "colorblind." That person is usually male, because the defect is genetically sex linked. Most people with *color-deficient vision* are not actually blind to all colors. They simply lack functioning red- or green-sensitive cones, or sometimes both. Their vision—perhaps unknown to them, because their lifelong vision *seems* normal—is monochromatic (one-color) or dichromatic (two-color) instead of trichromatic, making it impossible to distinguish the red and green in **Figure 18.8** (Boynton, 1979).

Dogs, too, lack receptors for the wavelengths of red, giving them only limited, dichromatic color vision (Neitz et al., 1989).

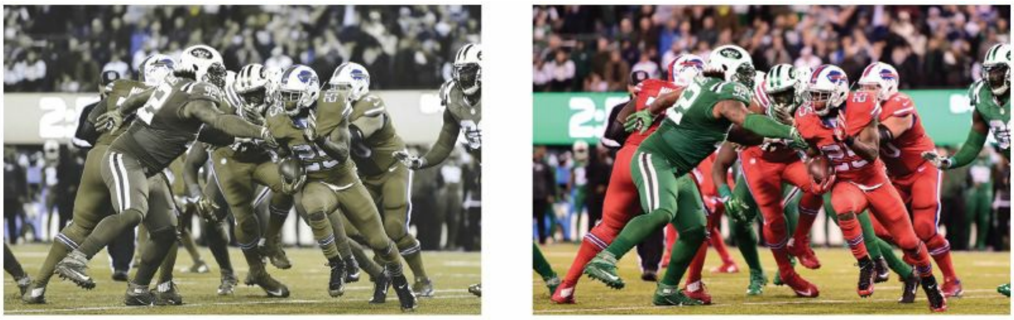

Figure 18.8
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BEN SOLOMON/The New York Times/Redux

Figure 18.8 Flummoxed fans

The photo on the left shows how people with red-green deficiency perceived a 2015 Buffalo Bills versus New York Jets football game. “For the 8 percent of Americans like me that are red-green colorblind, this game is a nightmare to watch,” tweeted one fan. “Everyone looks like they’re on the same team,” said another. The photo on the right shows how the game looked for those with normal color vision.

But why do people blind to red and green often still see yellow? And why does yellow appear to be a pure color and not a mixture of red and green, the way purple is of red and blue? As physiologist Ewald Hering—a contemporary of von Helmholtz—noted, trichromatic theory leaves some parts of the color vision mystery unsolved.

Hering found a clue in *afterimages*. Stare at a green square for a while and then look at a white sheet of paper, and you will see red, green’s *opponent color*. Stare at a yellow square, and its opponent color, blue, will appear on the white paper. (To experience this, try the flag demonstration in **Figure 18.9**.) Hering formed another hypothesis: Color vision must involve two *additional* color processes, one responsible for red-versus-green perception, and one for blue-versus-yellow perception.

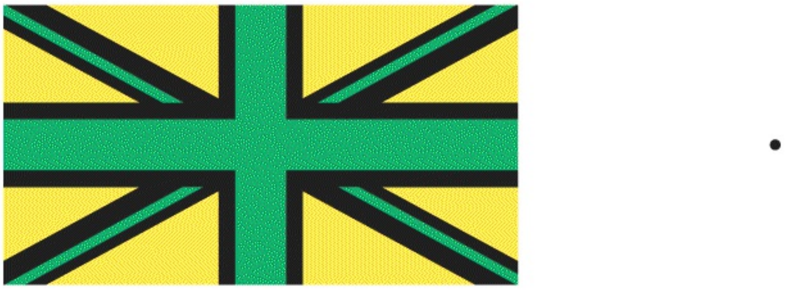

Figure 18.9
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Figure 18.9 Negative afterimage

Stare at the center of the flag for a minute and then shift your eyes to the dot in the white space beside it. What do you see? (After tiring your neural response to black, green, and yellow, you should see their opponent colors.) Stare at a white wall and note how the size of the flag grows with the projection distance.

Indeed, a century later, researchers also confirmed Hering's hypothesis, now called the **opponent-process theory**. This concept is tricky, but here is the gist: Color vision depends on three sets of opposing retinal processes—*red-green*, *blue-yellow*, and *white-black.* As impulses travel to the visual cortex, some neurons in both the retina and the thalamus are turned "on" by red but turned "off" by green. Others are turned on by green but off by red (DeValois & DeValois, 1975). Like red and green marbles sent down a narrow tube, "red" and "green" messages cannot both travel at once. Red and green are thus opponents, so we see either red or green, not a reddish-green mixture. But red and blue travel in separate channels, so we *can* see a reddish-blue magenta.

opponent-process theory

the theory that opposing retinal processes (red-green, blue-yellow, white-black) enable color vision. For example, some cells are stimulated by green and inhibited by red; others are stimulated by red and inhibited by green.

So how does opponent-process theory help us understand negative afterimages, as in the flag demonstration? Here's the answer (for the green changing to red): First, you stared at green bars, which tired your green response. Then you stared at a white area. White contains all colors, including red. Because you had tired your green response, only the red part of the green-red pairing fired normally.

The present solution to the mystery of color vision is therefore roughly this: *Color processing occurs in two stages.*

1. The retina’s red, green, and blue cones respond in varying degrees to different color stimuli, as the Young-Helmholtz trichromatic theory suggested.
2. The cones’ responses are then processed by opponent-process cells, as Hering’s opponent-process theory proposed.

✓ Check Your Understanding

Ask Yourself

- Does it surprise you to learn that colors don’t “live” in the objects we perceive—that in fact, these objects are everything *but* the color we experience? If someone had asked you “Is grass green?” before you read this section, how would you have responded?

Test Yourself

- What are two key theories of color vision? Are they contradictory or complementary? Explain.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Feature Detection

Flip It Video: Feature Detectors

18-4 Where are feature detectors located, and what do they do?

Scientists once likened the brain to a movie screen on which the eye projected images. Then along came David Hubel and Torsten Wiesel

(1979), who showed that our visual processing deconstructs visual images and then reassembles them. Hubel and Wiesel received a Nobel Prize for their work on **feature detectors,** nerve cells in the occipital lobe's visual cortex that respond to a scene's edges, lines, angles, and movements.

feature detectors

nerve cells in the brain's visual cortex that respond to specific features of the stimulus, such as shape, angle, or movement.

Alex Livesey - FIFA/Getty Images

Well-developed supercells In this 2011 World Cup match, USA's Abby Wambach instantly processed visual information about the positions and movements of Brazil's defenders and goalkeeper and somehow managed to get the ball around them all and into the net.

Using microelectrodes, they had discovered that some neurons fired actively when cats were shown lines at one angle, while other neurons responded to lines at a different angle. They surmised that these specialized neurons, now known as feature detectors, receive information from individual ganglion cells in the retina. Feature detectors pass this specific information to other cortical areas, where teams of cells *(supercell clusters)* respond to more complex patterns.

For biologically important objects and events, monkey brains (and surely ours as well) have a "vast visual encyclopedia" distributed as specialized cells (Perrett et al., 1990, 1992, 1994). These cells respond to one type of stimulus, such as a specific gaze, head angle, posture, or body movement. Other supercell clusters integrate this information and fire only when the cues collectively indicate the direction of someone’s attention and approach. This instant analysis, which aided our ancestors’ survival, also helps a soccer player anticipate where to strike the ball, and a driver anticipate a pedestrian’s next movement.

As we noted in Module 12, one temporal lobe area by your right ear (**Figure 18.10**) enables you to perceive faces and, thanks to a specialized neural network, to recognize them from varied viewpoints (Connor, 2010). If stimulated in this *fusiform face area,* you might spontaneously see faces—as did the participant who reported to an experimenter that “You just turned into someone else. Your face metamorphosed” (Koch, 2015). If this face recognition region were damaged, you might recognize other forms and objects, but not familiar faces.

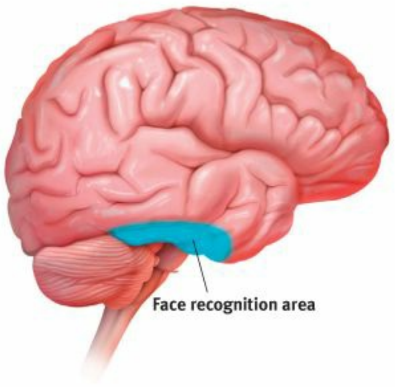

Figure 18.10
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Figure 18.10 Face recognition processing

In social animals such as humans, a large right temporal lobe area (shown here in a right-facing brain) is dedicated to the crucial task of face recognition.

When researchers temporarily disrupt the brain’s face-processing areas with magnetic pulses, people are unable to recognize faces. But they can still recognize other objects, such as houses, because the brain’s face perception occurs separately from its object perception (McKone et al., 2007; Pitcher et al., 2007). Thus, functional MRI (fMRI) scans have shown different brain areas activating when people viewed varied objects (Downing et al., 2001). Brain activity is so specific that, with the help of brain scans, researchers can tell whether people are “looking at a shoe, a chair, or a face, based on the pattern of their brain activity,” (Haxby, 2001).

Parallel Processing

18-5 How does the brain use parallel processing to construct visual perceptions?

Our brain achieves these and other remarkable feats by **parallel processing**: doing many things at once. To analyze a visual scene, the brain divides it into subdimensions—motion, form, depth, color—and works on each aspect simultaneously (**Figure 18.11**). We then construct our perceptions by integrating *(binding)* the separate but parallel work of these different visual teams (Livingstone & Hubel, 1988).

parallel processing

processing many aspects of a problem simultaneously; the brain’s natural mode of information processing for many functions, including vision.

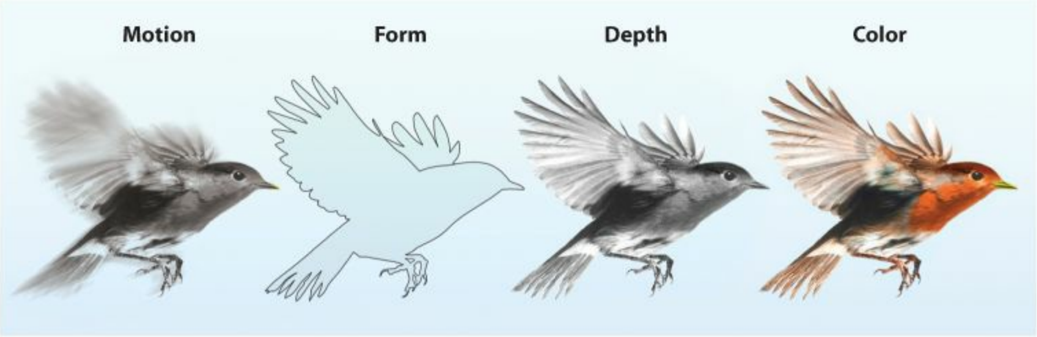

Figure 18.11
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Figure 18.11 Parallel processing

Studies of patients with brain damage suggest that the brain delegates the work of processing motion, form, depth, and color to different areas. After taking a scene apart, the brain integrates these subdimensions into the perceived image. How does the brain do this? The answer to this *binding problem* (how does the brain bind multiple sensory inputs into a single perception?) is the Holy Grail of vision research.

To recognize a face, your brain integrates information projected by your retinas to several visual cortex areas and compares it with stored information, thus enabling your fusiform face area to recognize the face: *Grandmother!* Scientists have debated whether this stored information is contained in a single cell or, more likely, distributed over a vast network of cells. Some supercells—actually nicknamed *grandmother cells*—do appear to respond very selectively to 1 or 2 faces in 100 (Bowers, 2009; Quiroga et al., 2013). The whole face recognition process requires tremendous brain power: 30 percent of the cortex (10 times the brain area devoted to hearing).

Destroy or disable the neural workstation for a visual subtask, and something peculiar results, as happened to “Mrs. M.” (Hoffman, 1998). After a stroke damaged areas near the rear of both sides of her brain, she could not perceive motion. People in a room seemed “suddenly here or there but I [had] not seen them moving.” Pouring tea into a cup was a challenge because the fluid appeared frozen—she could not perceive it rising in the cup.

After stroke or surgery has damaged the brain’s visual cortex, others have experienced *blindsight* (a phenomenon we met in Module 13). Shown a series of sticks, they report seeing nothing. Yet when asked to guess whether the sticks are vertical or horizontal, their visual intuition typically offers the correct response. When told, “You got them all right,” they are astounded. There is, it seems, a second “mind”—a parallel processing system—operating unseen. These separate visual systems for perceiving and for acting illustrate once again the astonishing dual processing of our two-track mind.

* * *

Think about the wonders of visual processing. As you read these words, the letters reflect light rays onto your retina, which triggers a process that sends formless nerve impulses to several areas of your brain, which integrate the information and decode its meaning. The amazing result: We have transferred information across time and space, from our minds to your mind (**Figure 18.12**). That all of this happens instantly, effortlessly, and continuously is indeed awesome. As Roger Sperry (1985) observed, the "insights of science give added, not lessened, reasons for awe, respect, and reverence."

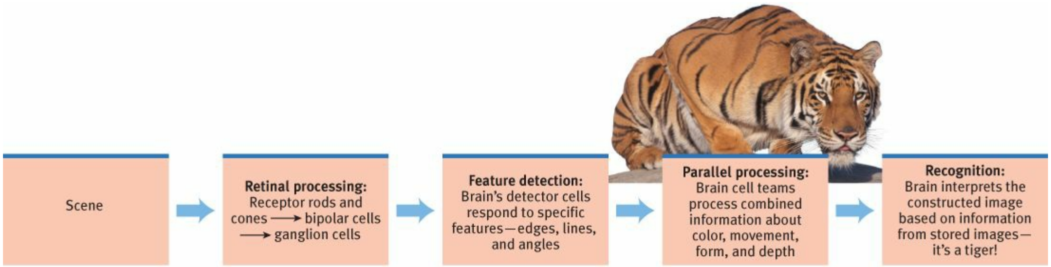
Scene
Retinal processing: Receptor rods and cones ⟶ bipolar cells ⟶ ganglion cells
Feature detection: Brain's detector cells respond to specific features—edges, lines, and angles
Parallel processing: Brain cell teams process combined information about color, movement, form, and depth
Recognition: Brain interprets the constructed image based on information from stored images—it's a tiger!

Figure 18.12
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Tom Walker/Photographer's Choice/Getty Images

Figure 18.12 A simplified summary of visual information processing

> "*I am fearfully and wonderfully made.*"
>
> *King David, Psalm 139:14*

✓ Check Your Understanding

Ask Yourself

- Do you know anyone with a visual disability, or perhaps you have one yourself? Do you now have a better sense of how the visual process could be disrupted?

Test Yourself

- What is the rapid sequence of events that occurs when you see and recognize a friend?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 18 REVIEW

18-1 What are the characteristics of the energy that we see as visible light? What structures in the eye help focus that energy?

- The *hue* we perceive in light depends on its *wavelength*, and its brightness depends on its *intensity*.
- After entering the eye through the *cornea*, passing through the *pupil* and *iris*, and being focused by the *lens*, light energy particles (from a thin slice of the broad spectrum of electromagnetic energy) strike the eye’s inner surface, the *retina*.

18-2 How do the rods and cones process information, and what is the path information travels from the eye to the brain?

- The retina’s light-sensitive *rods* and color-sensitive *cones* convert light energy into neural impulses.
- *Cones* are found in and around the *fovea*. Many cones have a direct hotline to the brain, transmitting their message to a single bipolar cell that relays it to the visual cortex. *Rods* are found in the retina’s outer regions. Several rods together transmit their energy to a single bipolar cell.
- Cones and rods each provide a special sensitivity—cones to detail and color, rods to faint light and peripheral motion.
- After processing by bipolar and ganglion cells in the eyes’ retina, neural impulses travel through the *optic nerve*, to the thalamus, and on to the visual cortex.

18-3 How do we perceive color in the world around us?

- The *Young-Helmholtz trichromatic (three-color) theory* proposed that the retina contains three types of color receptors. Contemporary research has found three types of cones, each most sensitive to the wavelengths of one of the three primary colors of light (red, green, or blue).

- Hering’s *opponent-process theory* proposed three additional color processes (red-versus-green, blue-versus-yellow, white-versus-black). Contemporary research has confirmed that, en route to the brain, neurons in the retina and the thalamus code the color-related information from the cones into pairs of opponent colors.
- These two theories, and the research supporting them, show that color processing occurs in two stages.

18-4 Where are feature detectors located, and what do they do?

- *Feature detectors,* specialized neurons in the occipital lobe’s visual cortex, respond to specific aspects of the visual stimulus.
- They receive information from individual ganglion cells in the retina and pass it to other cortical areas, where supercell clusters respond to more complex patterns.

18-5 How does the brain use parallel processing to construct visual perceptions?

- Through *parallel processing,* the brain handles many aspects of vision (color, movement, form, and depth) simultaneously. Other neural teams integrate the results, comparing them with stored information and enabling perceptions.

Multiple-Choice Questions

1. Which perceptual process explains why you can see varied aspects of your favorite singer’s face and instantly recognize him or her?

a. Selective attention
b. Accommodation
c. Psychokinesis
d. Blindsight

   e. Parallel processing

2. What do we call the specialized neurons in the occipital lobe's visual cortex that respond to particular edges, lines, angles, and movements?

   a. Rods
   b. Cones
   c. Bipolar cells
   d. Feature detectors
   e. Ganglion cells

3. Which of the following structures helps you *most* in detecting the color of your friend's shirt?

   a. Rods
   b. Cones
   c. Fovea
   d. Lens
   e. Cornea

4. Your best friend decides to paint her room an extremely bright electric blue. Which of the following best describes the physical properties of the color's light waves?

   a. No wavelength; large amplitude
   b. Short wavelength; large amplitude
   c. Short wavelength; small amplitude
   d. Long wavelength; large amplitude
   e. No wavelength; small amplitude

5. If you scratch your eye, which structure are you most likely to damage?

   a. Pupil
   b. Iris
   c. Cornea
   d. Lens
   e. Fovea

Practice FRQs

1. As light reflected off an object reaches your eye, it passes through several structures before it reaches the retina. Describe the functions of the following structures:
    - Cornea
    - Iris
    - Lens

(3 points)

Answer

1 point: The cornea bends and focuses the light waves. Page 177

1 point: The iris can expand or contract to allow more or less light to pass through the pupil. Page 177

1 point: The lens changes shape to help focus images on the retina. Page 177

2. Yasser is colorblind and is unable to see colors the same way as his wife. Describe which theory of color vision best explains this deficiency and explain which theory of color vision best explains why he might see an afterimage.

(2 points)

Module **19 Visual Organization and Interpretation**

LEARNING TARGETS

- 19-1 Describe the Gestalt psychologists’ understanding of perceptual organization, and explain how figure-ground and grouping principles contribute to our perceptions.
- 19-2 Explain how we use binocular and monocular cues to perceive the world in three dimensions, and discuss how we perceive motion.
- 19-3 Explain how perceptual constancies help us construct meaningful perceptions.
- 19-4 Describe what research on restored vision, sensory restriction, and perceptual adaptation reveals about the effects of experience on perception.

Perceptual Organization

Flip It Video: Gestalt Psychology

19-1 How did the Gestalt psychologists understand perceptual organization, and how do figure-ground and grouping principles contribute to our perceptions?

It’s one thing to understand how we see colors and shapes. But how do we organize and interpret those sights (or sounds, or tastes, or smells) so that they become *meaningful* perceptions—a rose in bloom, a familiar face, a sunset?

Early in the twentieth century, a group of German psychologists noticed that people who are given a cluster of sensations tend to organize them into a **gestalt**, a German word meaning a “form” or a “whole.” As we look straight ahead, we cannot separate the perceived scene into our left and right fields of view (each as seen with one eye closed). Our conscious perception is, at every moment, a seamless scene—an integrated whole.

gestalt

an organized whole. Gestalt psychologists emphasized our tendency to integrate pieces of information into meaningful wholes.

Consider **Figure 19.1**: The individual elements of this figure, called a *Necker cube,* are really nothing but eight blue circles, each containing three converging white lines. When we view these elements all together, however, we see a cube that sometimes reverses direction. This phenomenon nicely illustrates a favorite saying of Gestalt psychologists: *In perception, the whole may exceed the sum of its parts.*

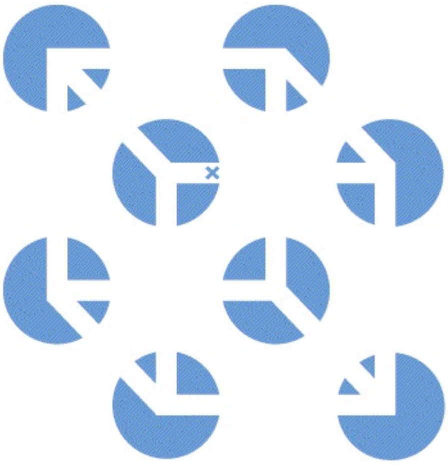

Figure 19.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
American Journal of Psychology. Copyright 1977 by the Board of Trustees of the University of Illinois. Used with permission of the University of Illinois Press.

Figure 19.1 A Necker cube

What do you see: circles with white lines, or a cube? If you stare at the cube, you may notice that it reverses location, moving the tiny X in the center from the front edge to the back. At times, the cube may seem to float forward, with circles behind it. At other times, the circles may become holes through which the cube appears, as though it were floating behind them. There is far more to perception than meets the eye. (From Bradley et al., 1976.)

Over the years, the Gestalt psychologists demonstrated many principles we use to organize our sensations into perceptions (Wagemans et al., 2012a,b). Underlying all of them is a fundamental truth: *Our brain does more than register information about the world.* Perception is not just opening a shutter and letting a picture print itself on the brain. We filter incoming information and *construct* perceptions. Mind matters.

Form Perception

Imagine designing a video-computer system that, like your eye-brain system, could recognize faces at a glance. What abilities would it need?

Figure and Ground

To start with, the system would need to perceive **figure-ground**—to separate faces from their backgrounds. In our eye-brain system, this is our first perceptual task—perceiving any object (the *figure*) as distinct from its surroundings (the *ground*). As you read, the words are the figure; the white space is the ground. This perception applies to our hearing, too. As you hear voices at a party, the one you attend to becomes the figure; all others are part of the ground. Sometimes the same stimulus can trigger more than one perception. In **Figure 19.2**, the figure-ground relationship continually reverses. First we see the vase, then the faces, but we always organize the stimulus into a figure seen against a ground.

figure-ground

the organization of the visual field into objects (the *figures*) that stand out from their surroundings (the *ground*).

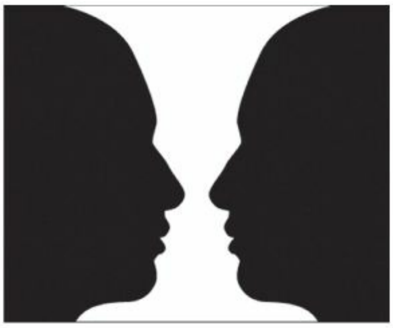

Figure 19.2
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Figure 19.2 **Reversible figure and ground**

AP® EXAM TIP

The Necker cube is an excellent vehicle for understanding the distinction between sensation and perception. Students often get these terms confused. The only visual stimuli are the blue wedges. The circles, lines, and cube are all the products of perception—they are in your mind and not on the page.

Grouping

Having discriminated figure from ground, we (and our video-computer system) must also organize the figure into a *meaningful* form. Some basic features of a scene—such as color, movement, and light-dark contrast—we process instantly and automatically (Treisman, 1987). Our mind brings order and form to other stimuli by following certain rules for **grouping**, also identified by the Gestalt psychologists. These rules, which we apply even as infants and even in our touch perceptions, illustrate how the perceived whole differs from the sum of its parts, rather as water differs from its hydrogen and oxygen parts (Gallace & Spence, 2011; Quinn et al., 2002; Rock & Palmer, 1990). Three examples:

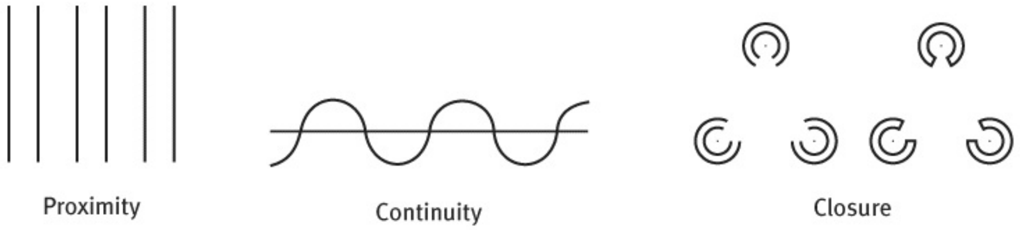
grouping

the perceptual tendency to organize stimuli into coherent groups.

Proximity: We group nearby figures together. We see not six separate lines, but three sets of two lines:

Continuity: We perceive smooth, continuous patterns rather than discontinuous ones. This pattern could be a series of alternating semicircles, but we perceive it as two continuous lines—one wavy, one straight:

Closure: We fill in gaps to create a complete, whole object. Thus we assume that the circles on the left are complete but partially blocked by the (illusory) triangle. Add nothing more than little line segments to close off the circles and your brain stops constructing a triangle.



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Such principles usually help us construct reality. Sometimes, however, they lead us astray, as when we look at the doghouse in **Figure 19.3**.

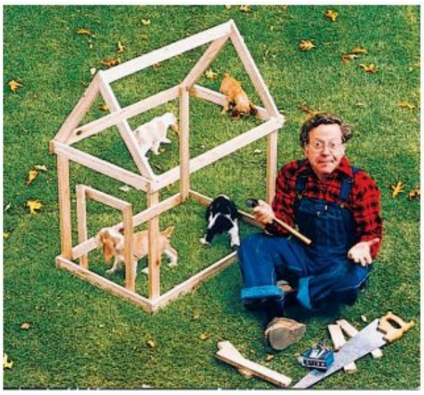

Figure 19.3
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Photo by Walter Wick. Reprinted by permission from GAMES Magazine © 1983 PCS Games Limited Partnership

Figure 19.3 Grouping principles

What's the secret to this impossible doghouse? You probably perceive this doghouse as a gestalt—a whole (though impossible) structure. Actually, your brain imposes this sense of wholeness on the picture. As Figure 19.7 shows, Gestalt grouping principles such as closure and continuity are at work here.

Depth Perception

19-2 How do we use binocular and monocular cues to see in three dimensions, and how do we perceive motion?

Our eye-brain system performs many remarkable feats, among which is **depth perception**. From the two-dimensional images falling on our retinas, we somehow organize three-dimensional perceptions that let us estimate the distance of an oncoming car or the height of a faraway house. How do we acquire this ability? Are we born with it? Did we learn it?

depth perception

the ability to see objects in three dimensions although the images that strike the retina are two-dimensional; allows us to judge distance.

As Eleanor Gibson picnicked on the rim of the Grand Canyon, her scientific curiosity kicked in. She wondered: *Would a toddler peering over the rim perceive the dangerous drop-off and draw back?* To answer that question and others, Gibson and Richard Walk (1960) designed a series of experiments in their Cornell University laboratory using a **visual cliff**—a model of a cliff with a "drop-off" area that was actually covered by sturdy glass. They placed 6- to 14-month-old infants on the edge of the "cliff" and had the infants' mothers coax them to crawl out onto the glass (**Figure 19.4**). Most infants refused to do so, indicating that they could perceive depth.

visual cliff

a laboratory device for testing depth perception in infants and young animals.

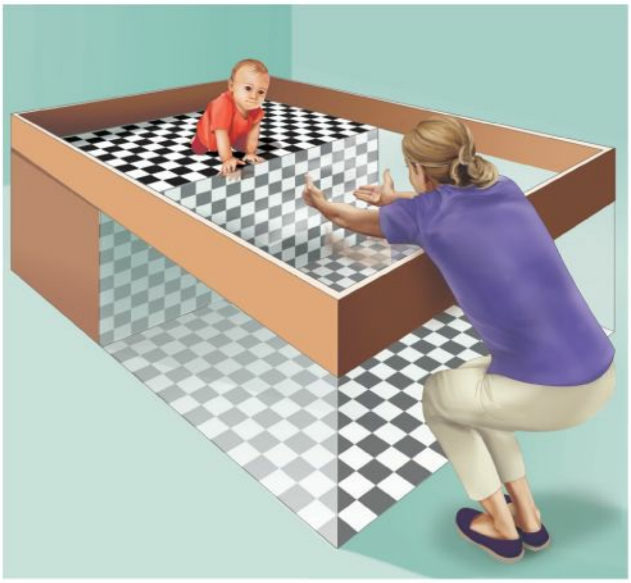

Figure 19.4

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Figure 19.4 **Visual cliff**

Eleanor Gibson and Richard Walk devised this miniature cliff with a glass-covered drop-off to determine whether crawling infants and newborn animals can perceive depth. Even when coaxed, infants are reluctant to venture onto the glass over the cliff.

Had they *learned* to perceive depth? Learning is surely part of the answer because crawling, no matter when it begins, seems to increase an infant's fear of heights (Adolph et al., 2014; Campos et al., 1992). But depth perception is also partly innate. Mobile newborn animals—even those with no visual experience (including young kittens, a day-old goat, and newly hatched chicks)—also refuse to venture across the visual cliff. Thus, biology prepares us to be wary of heights, and experience amplifies that fear.

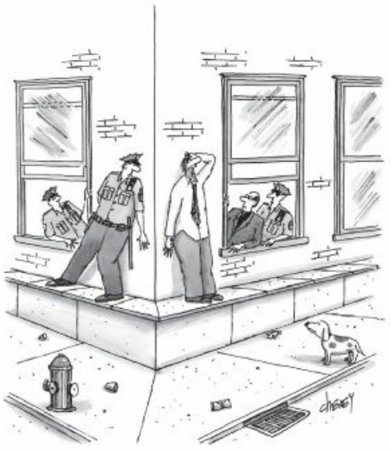
If we were to build the ability to perceive depth into our video-computer system, what rules might enable it to convert two-dimensional images into a single three-dimensional perception? A good place to start would be the depth cues our brain receives from information supplied by one or both of our eyes.

Binocular Cues

People who see with two eyes perceive depth thanks partly to **binocular cues**. Here's an example: With both eyes open, hold two pens or pencils in front of you and touch their tips together. Now do so with one eye closed. A more difficult task, yes?

binocular cue

a depth cue, such as retinal disparity, that depends on the use of two eyes.



Tom Cheney/New Yorker Cartoon/Cartoon Bank

“I can’t go on living with such lousy depth perception!”

We use binocular cues to judge the distance of nearby objects. One such cue is *convergence,* the inward angle of the eyes focusing on a near object. Another is **retinal disparity.** Because your eyes are about 2½ inches apart, your retinas receive slightly different images of the world. By comparing these two images, your brain can judge how close an object is to you. The greater the disparity (difference) between the two retinal images, the closer the object. Try it. Hold your two index fingers, with the tips about half an inch apart, directly in front of your nose, and your retinas will receive quite different views. If you close one eye and then the other, you can see the difference. (Bring your fingers close and you can create a finger sausage, as in **Figure 19.5**.) At a greater distance—say, when you hold your fingers at arm’s length—the disparity is smaller.

retinal disparity

a binocular cue for perceiving depth. By comparing retinal images from the two eyes, the brain computes distance—the greater the disparity (difference) between the two images, the closer the object.

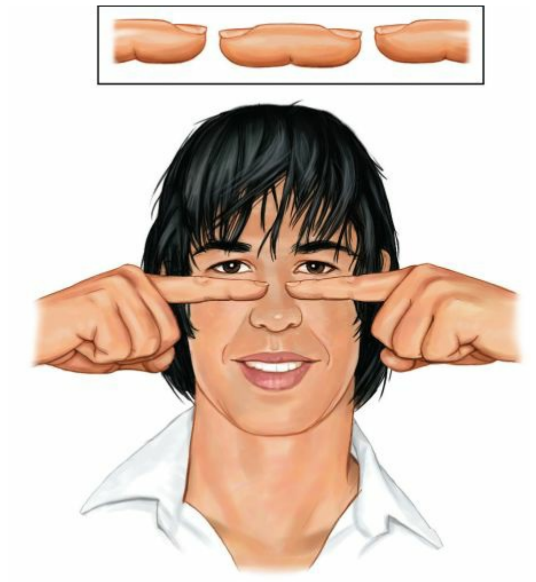


Figure 19.5
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Figure 19.5 The floating finger sausage

Hold your two index fingers about 5 inches in front of your eyes, with their tips half an inch apart. Now look beyond them and note the weird result. Move your fingers out farther and the retinal disparity—and the finger sausage—will shrink.

We could easily include retinal disparity in our video-computer system. Moviemakers sometimes film a scene with two cameras placed a few inches apart. Viewers then watch the film through glasses that allow the left eye to see only the image from the left camera, and the right eye to see only the image from the right camera. The resulting effect, as 3-D movie fans know, mimics or exaggerates normal retinal disparity, giving the perception of depth.

FYI

Carnivorous animals, including humans, have eyes that enable forward focus on prey and offer binocular vision-enhanced depth perception. Grazing herbivores, such as horses and sheep, typically have eyes on the sides of their skull. Although lacking binocular depth perception, they have sweeping peripheral vision.

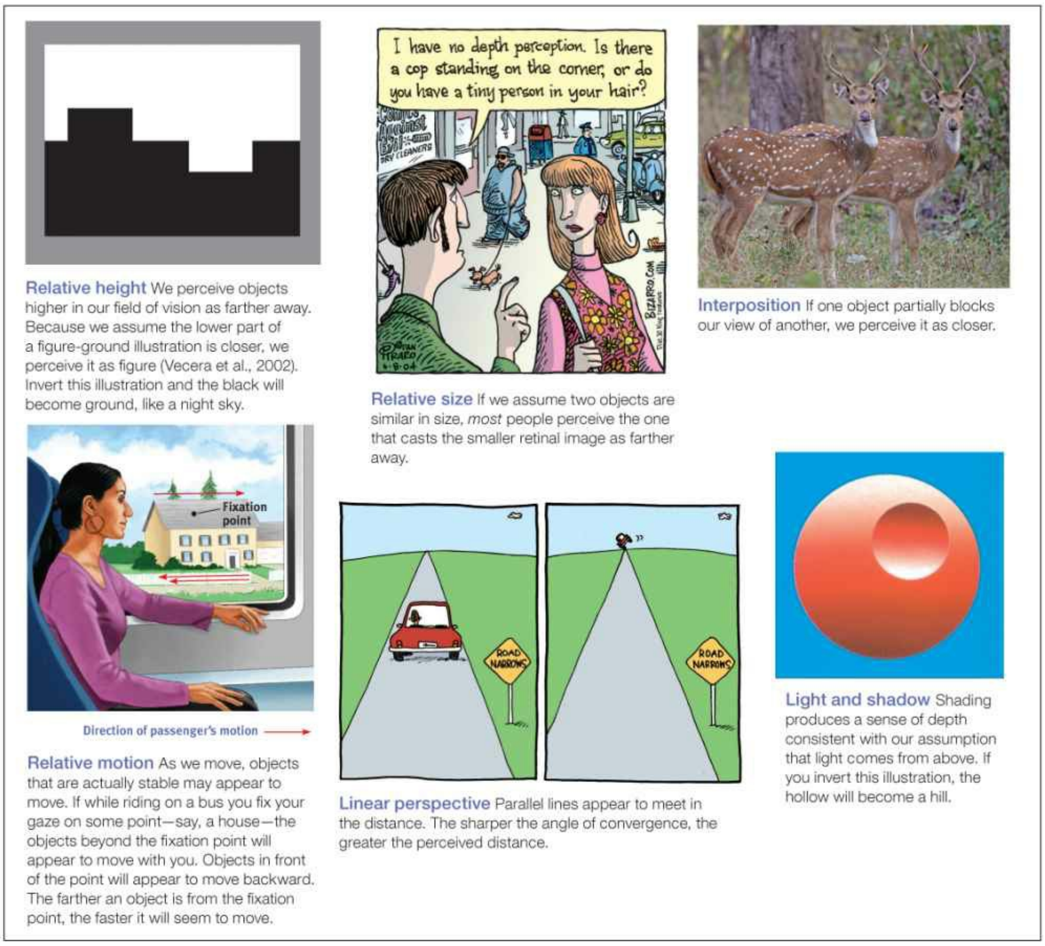
Monocular Cues

Flip It Video: Monocular Cues

How do we judge whether a person is 10 or 100 meters away? Retinal disparity won’t help us here, because there won’t be much difference between the images cast on our right and left retinas. At such distances, we depend on **monocular cues** (depth cues available to each eye separately). See **Figure 19.6** for some examples.

monocular cue

a depth cue, such as interposition or linear perspective, available to either eye alone.


I have no depth perception. Is there a cop standing on the corner, or do you have a tiny person in your hair?
BIZARRO.COM
Fixation point
Direction of passenger's motion
ROAD NARROWS
ROAD NARROWS

Relative height We perceive objects higher in our field of vision as farther away. Because we assume the lower part of a figure-ground illustration is closer, we perceive it as figure (Vecera et al., 2002). Invert this illustration and the black will become ground, like a night sky.

Relative size If we assume two objects are similar in size, *most* people perceive the one that casts the smaller retinal image as farther away.

Interposition If one object partially blocks our view of another, we perceive it as closer.

Relative motion As we move, objects that are actually stable may appear to move. If while riding on a bus you fix your gaze on some point—say, a house—the objects beyond the fixation point will appear to move with you. Objects in front of the point will appear to move backward. The farther an object is from the fixation point, the faster it will seem to move.

Linear perspective Parallel lines appear to meet in the distance. The sharper the angle of convergence, the greater the perceived distance.

Light and shadow Shading produces a sense of depth consistent with our assumption that light comes from above. If you invert this illustration, the hollow will become a hill.

Figure 19.6

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Top Left: Image courtesy of Shaun P. Vecera, Ph.D., adapted from stimuli that appeared in Vecera et al. 2002; Top Middle: BIZARRO © 2014 Dan Piraro, Dist. by King Features; Top Right: Philip Mugridge/Alamy; Bottom Middle: King Features Syndicate; Bottom Right: © George V. Kelvin

Figure 19.6 **Monocular depth cues**

Motion Perception

Imagine that, like Mrs. M. described earlier, you could perceive the world as having color, form, and depth but that you could not see motion. Not only would you be unable to bike or drive, you would have trouble writing, eating, and walking.

Normally your brain computes motion based partly on its assumption that shrinking objects are retreating (not getting smaller) and enlarging objects are approaching. But you are imperfect at motion perception. In young children, this ability to correctly perceive approaching (and enlarging) vehicles is not yet fully developed, which puts them at risk for pedestrian accidents (Wann et al., 2011). But it's not just children who have occasional difficulties with motion perception. An adolescent or adult brain is also sometimes tricked into believing what it is not seeing. When large and small objects move at the same speed, the large objects appear to move more slowly. Thus, trains seem to move slower than cars, and jumbo jets seem to land more slowly than little jets.

> “*Sometimes I wonder: Why is that Frisbee getting bigger? And then it hits me.*”
>
> *Anonymous*

Our brain also perceives a rapid series of slightly varying images as continuous movement (a phenomenon called *stroboscopic movement*). As film animators know well, a superfast slide show of 24 still pictures a second will create an illusion of movement. We construct that motion in our heads, just as we construct movement in blinking marquees and holiday lights. We perceive two adjacent stationary lights blinking on and off in quick succession as one single light moving back and forth. Lighted signs exploit this **phi phenomenon** with a succession of lights that creates the impression of, say, a moving arrow.

phi phenomenon

an illusion of movement created when two or more adjacent lights blink on and off in quick succession.

Perceptual Constancy

19-3 How do perceptual constancies help us construct meaningful perceptions?

AP® EXAM TIP

The illustrations in Figure 19.6 provide you with excellent opportunities to practice identifying monocular depth cues. To really demonstrate your understanding, look for these cues in other drawings and photographs. There are almost always cues to identify. This practice will help you master the terms for the AP® exam.

So far, we have noted that our video-computer system must perceive objects as we do—as having a distinct form, location, and perhaps motion. Its next task is to recognize objects without being deceived by changes in their color, brightness, shape, or size—a *top-down* process called **perceptual constancy**. Regardless of the viewing angle, distance, and illumination, we can identify people and things in less time than it takes to draw a breath. This feat, which challenges even advanced computers, would be a monumental challenge for a video-computer system.

perceptual constancy

perceiving objects as unchanging (having consistent color, brightness, shape, and size) even as illumination and retinal images change.

Color and Brightness Constancies

Our experience of color depends on an object's *context*. This would be clear if you viewed an isolated tomato through a paper tube over the course of a day. As the light—and thus the tomato's reflected wavelengths—changed, the tomato's color would also seem to change. But if you discarded the paper tube and viewed the tomato as one item in a salad bowl, its perceived color would remain essentially constant. This perception of consistent color we call **color constancy**.

color constancy

perceiving familiar objects as having consistent color, even if changing illumination alters the wavelengths reflected by the object.

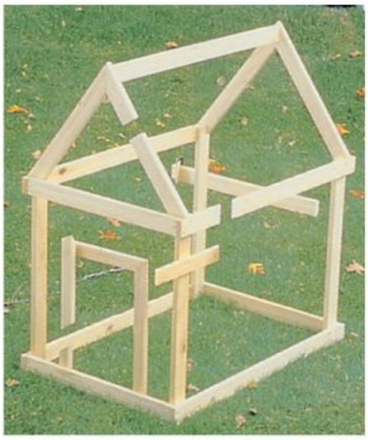

Figure 19.7
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Photo by Walter Wick. Reprinted from GAMES Magazine © 1983 PCS Games Limited Partnership

Figure 19.7 The solution

Another view of the impossible doghouse in Figure 19.3 reveals the secrets of this illusion. From the photo angle in Figure 19.3, the grouping principle of closure leads us to perceive the boards as continuous.

Though we take color constancy for granted, this ability is truly remarkable. A blue poker chip under indoor lighting reflects wavelengths that match those reflected by a sunlit gold chip (Jameson, 1985). Yet bring a goldfinch indoors and it won't look like a bluebird. The color is not in the chip or the bird’s feathers. We see color thanks to our brain’s computations of the light reflected by an object *relative to the objects surrounding it*. **Figure 19.8** dramatically illustrates the ability of a blue object to appear very different in three different contexts. Yet we have no trouble seeing these disks as blue. Nor does knowing the truth—that these disks are identically colored—diminish our perception that they are quite different. Because we construct our perceptions, we can simultaneously accept alternative objective and subjective realities.

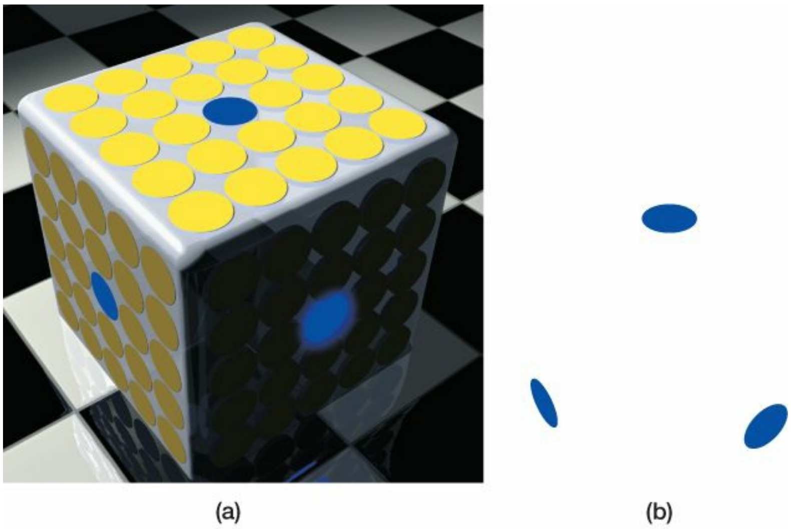

Figure 19.8
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R. Beau Lotto/Lottolab

Figure 19.8 Color depends on context

(a) Believe it or not, these three blue disks are identical in color. (b) Remove the surrounding context and see what results.

Brightness constancy (also called *lightness constancy*) similarly depends on context. We perceive an object as having a constant brightness even as its illumination varies. This perception of constancy depends on *relative luminance*—the amount of light an object reflects *relative to its surroundings* (**Figure 19.9**). White paper reflects 90 percent of the light falling on it; black paper, only 10 percent. Although a black paper viewed in sunlight may reflect 100 times more light than does a white paper viewed indoors, it will still look black (McBurney & Collings, 1984). But if you view sunlit black paper through a narrow tube so nothing else is visible, it may look gray, because in bright sunshine it reflects a fair amount of light. View it without the tube and it is again black, because it reflects much less light than the objects around it.

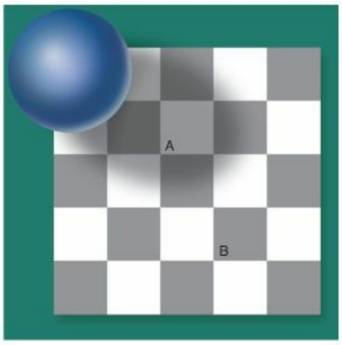

Figure 19.9
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Figure 19.9 Relative luminance

Because of its surrounding context, we perceive Square A as lighter than Square B. But believe it or not, they are identical. To channel comedian Richard Pryor, "Who you gonna believe: me, or your lying eyes?" If you believe your lying eyes—actually, your lying brain—you can photocopy (or screen-capture and print) the illustration, then cut out the squares and compare them. (Information from Edward Adelson.)

This principle—that we perceive objects not in isolation but in their environmental context—matters to artists, interior decorators, and clothing designers. Our perception of the color and brightness of a wall or of a streak of paint on a canvas is determined not just by the paint in the can but by the surrounding colors. The take-home lesson: *Context governs our perceptions.*

Shape and Size Constancies

Sometimes an object whose actual shape cannot change *seems* to change shape with the angle of our view. More often, thanks to *shape constancy*, we perceive the form of familiar objects, such as the door in **Figure 19.10**, as constant even while our retinas receive changing images of them. Our brain manages this feat because visual cortex neurons rapidly learn to associate different views of an object (Li & DiCarlo, 2008).

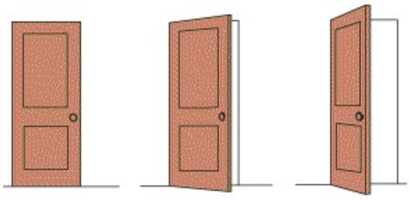

Figure 19.10
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 19.10 Shape constancy

A door casts an increasingly trapezoidal image on our retinas as it opens. Yet we still perceive it as rectangular.

Thanks to *size constancy,* we perceive an object as having an unchanging size, even while our distance from it varies. We assume a car is large enough to carry people, even when we see its tiny image from two blocks away. This assumption also illustrates the close connection between perceived *distance* and perceived *size.* Perceiving an object's distance gives us cues to its size. Likewise, knowing its general size—that the object is a car—provides us with cues to its distance.

Even in size-distance judgments, however, we consider an object's context. This interplay between perceived size and perceived distance helps explain several well-known illusions, including the *Moon illusion:* The Moon looks up to 50 percent larger when near the horizon than when high in the sky. Can you imagine why?

For at least 22 centuries, scholars have wondered (Hershenson, 1989). One reason is that monocular cues to an object's distance make the horizon Moon seem farther away. If it's farther away, our brain assumes, it must be larger than the Moon high in the night sky (Kaufman & Kaufman, 2000). But again, if you use a paper tube to take away the distance cue, the horizon Moon will immediately seem smaller.

Size-distance relationships also explain why, in **Figure 19.11**, the two same-age girls seem so different in size. As the diagram reveals, the girls are actually about the same size, but the room is distorted. Viewed with one eye through a peephole, the Ames room's trapezoidal walls produce the same images you would see in a normal rectangular room viewed with both eyes. Presented with the camera’s one-eyed view, your brain makes the reasonable assumption that the room is normal and each girl is therefore the same distance from you. Given the different sizes of the girls’ images on your retinas, your brain ends up calculating that the girls must be very different in size.

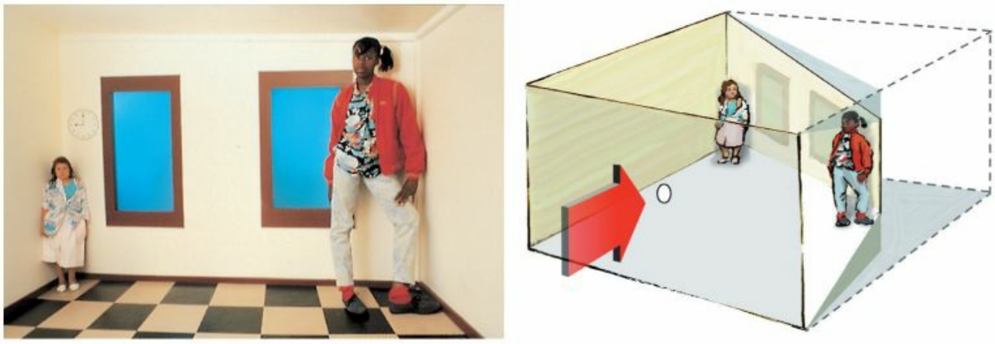

Figure 19.11
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Susan Schwartzenberg © Exploratorium, www.exploratorium.edu

Figure 19.11 The illusion of the shrinking and growing girls

This distorted room, designed by Adelbert Ames, appears to have a normal rectangular shape when viewed through a peephole with one eye. The girl in the right corner appears disproportionately large because we judge her size based on the false assumption that she is the same distance away as the girl in the left corner.

Perceptual illusions reinforce a fundamental lesson: Perception is not merely a projection of the world onto our brain. Rather, our sensations are disassembled into information bits that our brain, using both bottom-up and top-down processing, then reassembles into its own functional model of the external world. During this reassembly process, our assumptions—such as the usual relationship between distance and size—can lead us astray. *Our brain constructs our perceptions.*

* * *

Form perception, depth perception, motion perception, and perceptual constancies illuminate how we organize our visual experiences. Perceptual organization applies to our other senses, too. Listening to an unfamiliar language, we have trouble hearing where one word stops and the next one begins. Listening to our own language, we automatically hear distinct words. This, too, reflects perceptual organization. But it is more, for we even organize a string of letters—THEDOGATEMEAT—into words that make an intelligible phrase, more likely “The dog ate meat” than “The do gate me at” (McBurney & Collings, 1984). This process involves not only the organization we’ve been discussing, but also interpretation—discerning meaning in what we perceive.

Perceptual Interpretation

Philosophers have debated whether our perceptual abilities should be credited to our nature or our nurture. To what extent do we *learn* to perceive? German philosopher Immanuel Kant (1724–1804) maintained that knowledge comes from our *inborn* ways of organizing sensory experiences. Indeed, we come equipped to process sensory information. But British philosopher John Locke (1632–1704) argued that through our experiences we also *learn* to perceive the world. Indeed, we learn to link an object's distance with its size. So, just how important is experience? How radically does it shape our perceptual interpretations?

> “*Let us then suppose the mind to be, as we say, white paper void of all characters, without any ideas: How comes it to be furnished? . . . To this I answer, in one word, from EXPERIENCE.*”
>
> *John Locke,* An Essay Concerning Human Understanding, *1690*

Experience and Visual Perception

19-4 What does research on restored vision, sensory restriction, and perceptual adaptation reveal about the effects of experience on perception?

Restored Vision and Sensory Restriction

Writing to John Locke, William Molyneux wondered whether “a man *born* blind, and now adult, taught by his *touch* to distinguish between a cube and a sphere” could, if made to see, visually distinguish the two. Locke's answer was *No,* because the man would never have *learned* to see the difference.

Marcio Jose Sanchez/AP Images

Learning to see At age 3, Mike May lost his vision in an explosion. Decades later, after a new cornea restored vision to his right eye, he got his first look at his wife and children. Alas, although signals were now reaching his visual cortex, it lacked the experience to interpret them. May could not recognize expressions, or faces, apart from features such as hair. Yet he can see an object in motion and has learned to navigate his world and to marvel at such things as dust floating in sunlight (Abrams, 2002; Gorlick, 2010; Huber et al., 2015).

Molyneux’s hypothetical case has since been put to the test with a few dozen adults who, though blind from birth, later gained sight (Gregory, 1978; Huber et al., 2015; von Senden, 1932). Most were born with cataracts—clouded lenses that allowed them to see only diffused light, rather as a sighted person might see a foggy image through a Ping-Pong ball sliced in half. After cataract surgery, the patients could distinguish figure from ground and could differentiate colors—suggesting that these aspects of perception are innate. But much as Locke supposed, they often remained unable to visually recognize objects that were familiar by touch.

Seeking to gain more control than is provided by clinical cases, researchers have restricted the vision of infant kittens (Hubel & Wiesel, 1963). After infancy, when their vision was restored, the kittens behaved much like the humans born with cataracts. They could distinguish color and brightness but not the form of a circle from that of a square. Their eyes had not degenerated; their retinas still relayed signals to their visual cortex. But lacking early stimulation, their brain’s cortical cells had not developed normal connections. Thus, the animals remained functionally blind to shape.

Surgery on children in India reveals that those who are blind from birth can benefit from removal of cataracts, and the younger they are, the more they benefit. But their visual acuity (sharpness) may never be normal (Chatterjee, 2015; Gandhi et al., 2014). For normal sensory and perceptual development, there is a *critical period*—an optimal period when exposure to certain stimuli or experiences is required.

Once this critical period has passed, sensory restrictions later in life do no permanent harm. When researchers cover an adult animal's eye for several months, its vision will be unaffected after the eye patch is removed. When surgeons remove cataracts that developed during late adulthood, most people are thrilled at the return to normal vision.

Perceptual Adaptation

Courtesy of Hubert Dolezal

Perceptual adaptation "Oops, missed," thought researcher Hubert Dolezal as he attempted a handshake while viewing the world through inverting goggles. Yet, believe it or not, kittens, monkeys, and humans can adapt to an inverted world.

Given a new pair of glasses, we may feel slightly disoriented, even dizzy. Within a day or two, we adjust. Our **perceptual adaptation** to changed visual input makes the world seem normal again. But imagine a far more dramatic new pair of glasses—one that shifts the apparent location of objects 40 degrees to the left. When you first toss a ball to a friend, it sails off to the left. Walking forward to shake hands with someone, you veer to the left.

perceptual adaptation

the ability to adjust to changed sensory input, including an artificially displaced or even inverted visual field.

Could you adapt to this distorted world? Not if you were a baby chicken. When fitted with such lenses, baby chicks continue to peck where food grains *seem* to be (Hess, 1956; Rossi, 1968). But we humans adapt to distorting lenses quickly. Within a few minutes your throws would again be accurate, your stride on target. Remove the lenses and you would experience an aftereffect: At first your throws would err in the *opposite* direction, sailing off to the right; but again, within minutes you would readapt.

Indeed, given an even more radical pair of glasses—one that literally turns the world upside down—you could still adapt. Psychologist George Stratton (1896) experienced this. He invented, and for eight days wore, optical headgear that flipped left to right *and* up to down, making him the first person to experience a right-side-up retinal image while standing upright. The ground was up, the sky was down.

At first, when Stratton wanted to walk, he found himself searching for his feet, which were now “up.” Eating was nearly impossible. He became nauseated and depressed. But he persisted, and by the eighth day he could comfortably reach for an object and, if his hands were in view, could walk without bumping into things. When Stratton finally removed the headgear, he readapted quickly. So did research participants who wore such gear in later experiments—while riding a motorcycle, skiing the Alps, or flying an airplane (Dolezal, 1982; Kohler, 1962). By actively moving about in their topsy-turvy world, they adapted to their new context and learned to coordinate their movements.

So do we learn to perceive the world? In part we do, as we constantly adjust to changed sensory input. Research on critical periods teaches us that early nurture sculpts what nature has provided. In less dramatic ways, nurture continues to do so throughout our lives. Experience guides, sustains, and maintains the brain pathways that enable our perceptions.

✓ Check Your Understanding

Ask Yourself

- Try drawing a realistic depiction of the scene from your window. Which monocular cues will you use in your drawing?

Test Yourself

- In terms of perception, a band’s lead singer would be considered _______________ (figure/ground), and the other musicians would be considered _______________ (figure/ground).
- What do we mean when we say that, in perception, “the whole may exceed the sum of its parts”?
- How do we normally perceive depth?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 19 REVIEW

19-1 How did the Gestalt psychologists understand perceptual organization, and how do figure-ground and grouping principles contribute to our perceptions?

- Gestalt psychologists searched for rules by which the brain organizes fragments of sensory data into *gestalts* (from the German word for “whole”), or meaningful forms. In pointing out that the whole may exceed the sum of its parts, they noted that we filter sensory information and construct our perceptions.
- To recognize an object, we must first perceive it (see it as a *figure*) as distinct from its surroundings (the *ground*). We bring order and form to stimuli by organizing them into meaningful *groups*, following such rules as proximity, continuity, and closure.

19-2 How do we use binocular and monocular cues to see in three dimensions, and how do we perceive motion?

- *Depth perception* is our ability to see objects in three dimensions and judge distance. The *visual cliff* and other research demonstrate that many species naturally perceive the world in three dimensions at, or very soon after, birth.
- *Binocular cues*, such as *retinal disparity*, are depth cues that rely on information from both eyes.
- *Monocular cues* (such as relative size, interposition, relative height, relative motion, linear perspective, and light and shadow) let us judge depth using information transmitted by only one eye.
- As objects move, we assume that shrinking objects are retreating and enlarging objects are approaching.
- A quick succession of images on the retina can create an illusion of movement, as in stroboscopic movement (experienced when viewing

filmed images) and the *phi phenomenon* (when we perceive movement between blinking lights).

19-3 How do perceptual constancies help us construct meaningful perceptions?

- *Perceptual constancy* enables us to perceive objects as stable despite the changing image they cast on our retinas.
- *Color constancy* is our ability to perceive consistent color in objects, even though the lighting and wavelengths shift.
- Brightness (or lightness) constancy is our ability to perceive an object as having a constant lightness even when its illumination—the light cast upon it—changes.
- Our brain constructs our experience of an object's color or brightness through comparisons with other surrounding objects.
- Shape constancy is our ability to perceive familiar objects (such as an opening door) as unchanging in shape.
- Size constancy is perceiving objects as unchanging in size despite their changing retinal images.
- Knowing an object's size gives us clues to its distance; knowing its distance gives clues about its size, but we sometimes misread monocular distance cues and reach the wrong conclusions, as in the Moon illusion.

19-4 What does research on restored vision, sensory restriction, and perceptual adaptation reveal about the effects of experience on perception?

- Experience guides our perceptual interpretations. People blind from birth who gained sight after surgery lack the experience to visually recognize shapes and forms.
- Sensory restriction research indicates that there is a critical period for some aspects of sensory and perceptual development. Without early stimulation, the brain's neural organization does not develop normally.

- People given glasses that shift the world slightly to the left or right, or even upside down, experience *perceptual adaptation.* They are initially disoriented, but they manage to adapt to their new context.

Multiple-Choice Questions

1. A teacher used distortion goggles, which shifted the wearer’s gaze 20 degrees, to demonstrate an altered perception. A student wearing the goggles initially bumped into numerous desks and chairs while walking around, but after 30 minutes of wearing the goggles was able to smoothly avoid obstacles, illustrating the concept of

a. perceptual adaptation.
b. visual interpretation.
c. sensory adaptation.
d. perceptual constancy.
e. binocular cues.

2. What do we call the illusion of movement that results from two or more stationary, adjacent lights blinking on and off in quick succession?

a. Phi phenomenon
b. Perceptual constancy
c. Binocular cues
d. Retinal disparity
e. Stroboscopic movement

3. Bryanna and Charles are in a dancing competition. It is easy for spectators to see them against the dance floor because of

a. the visual cliff.
b. the phi phenomenon.
c. color constancy.
d. sensory restriction.
e. figure-ground relationships.

4. Narmeen is viewing the board in the classroom. She knows that the board is located far away because the view from her left eye is slightly different than the view from her right eye. Her ability to judge the distance of the board is due to which depth cue?

a. Retinal disparity
b. Relative size
c. Linear perspective
d. Relative motion
e. Convergence

5. Which of the following statements is best explained by research on depth perception using the visual cliff?

a. Binocular depth cues develop before monocular depth cues.
b. Monocular depth cues develop before binocular depth cues.
c. Human infants are born with an innate sense of depth.
d. Human infants must learn to perceive depth.
e. Humans do not develop the perception of depth until 24 months of age.

6. Even though the banana seemed to change color as the lighting in the room changed, Jane knew that the color of the banana was not actually changing. This is due to

a. perceptual adaptation.
b. convergence.
c. color constancy.
d. interposition.
e. relative luminance.

Practice FRQs

1. Look at the relative size cartoon in Figure 19.6. Describe how the artist incorporated relative size, linear perspective, and interposition to create depth.

Answer

Specific explanations may utilize different aspects of the cartoon.

1 point: Relative size: We know that the woman is closer to us than the police officer because she is drawn larger, or we know that the police officer is farther away because he is drawn smaller. Page 191

1 point: Linear perspective: We can tell that the sidewalk is receding into the distance because its sides pinch closer together in the background of the image. Page 191

1 point: Interposition: We know the woman is closer to us than the police officer because our view of her partially blocks our view of him, or we know the green car is farther away because it is being blocked by the lamp post. Page 191

2. Imagine that you attend a sporting event at your school. Explain how the following terms affect your perception of the game:

- Gestalt
- Proximity
- Interposition

(3 points)

Module 20 Hearing

LEARNING TARGETS

- 20-1 Describe the characteristics of air pressure waves that we hear as sound.
- 20-2 Explain how the ear transforms sound energy into neural messages.
- 20-3 Discuss how we detect loudness, discriminate pitch, and locate sounds.

Like our other senses, our hearing, or **audition**, helps us adapt and survive. Hearing provides information and enables relationships. Hearing humanizes us; people seem more thoughtful, competent, and likable when we hear them than when we merely read their words (Schroeder & Epley, 2015, 2016). And hearing is pretty spectacular. It lets us communicate invisibly, shooting unseen air waves across space and receiving the same from others. Hearing loss is therefore an invisible disability. To not catch someone’s name, to not grasp what someone is asking, and to miss the hilarious joke is to be deprived of what others know, and sometimes to feel excluded. As a person with hearing loss, I [DM] know the feeling and can understand why adults with significant hearing loss experience a doubled risk of depression (Li et al., 2014).

audition

the sense or act of hearing.

Most of us, however, can hear a wide range of sounds, and the ones we hear best are those in the range of the human voice. With normal hearing, we are remarkably sensitive to faint sounds, such as a phone ping. (If our ears were only slightly more sensitive, we would hear a constant hiss from the movement of air molecules.) Our distant ancestors’ survival depended on this keen hearing when hunting or being hunted.

We are also remarkably attuned to sound variations. Among thousands of possible voices, we easily recognize an unseen friend’s. Moreover, hearing is fast. “It might take you a full second to notice something out of the corner of your eye, turn your head toward it, recognize it, and respond to it,” notes auditory neuroscientist Seth Horowitz (2012). “The same reaction to a new or sudden sound happens at least 10 times as fast.” A fraction of a second after such events stimulate your ear’s receptors, millions of neurons have simultaneously coordinated in extracting the essential features, comparing them with past experience, and identifying the stimulus (Freeman, 1991). For hearing as for our other senses, we wonder: How do we do it?

AP® EXAM TIP

Pay attention to how many pages are devoted to each of the senses. Not only does this represent the complexity of the sensory system, it also represents how likely you are to find questions about that system on the AP® exam. Given that more pages are devoted to vision than hearing, there are likely to be more exam questions on vision.

The Stimulus Input: Sound Waves

20-1 What are the characteristics of air pressure waves that we hear as sound?

Draw a bow across a violin, and you will unleash the energy of sound waves. Air molecules, each bumping into the next, create waves of compressed and expanded air, like the ripples on a pond circling out from a tossed stone. As we swim in our ocean of moving air molecules, our ears detect these brief air pressure changes.

TAMPA ELECTRI

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The sounds of music A violin's short, fast waves create a high pitch, a cello's longer, slower waves a lower pitch. Differences in the waves' height, or amplitude, also create differing degrees of loudness. (To review the physical properties of sound waves, see Figure 20.1.)

Like light waves, sound waves vary in shape (**Figure 20.1**). The height, or *amplitude,* of sound waves determines their perceived *loudness.* Their length, or **frequency**, determines the **pitch** (the high or low tone) we experience. Long waves have low frequency—and low pitch. Short waves have high frequency—and high pitch. Sound waves produced by a soprano are much shorter and faster than those produced by a baritone singer.

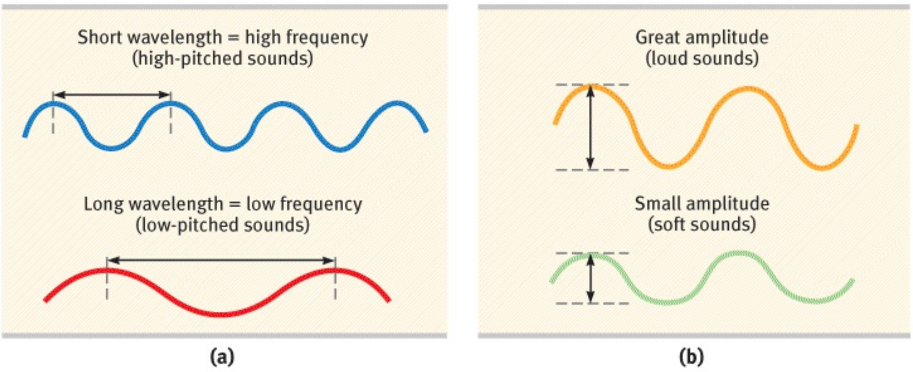
Short wavelength = high frequency
(high-pitched sounds)
Long wavelength = low frequency
(low-pitched sounds)
(a)
Great amplitude
(loud sounds)
Small amplitude
(soft sounds)
(b)

Figure 20.1
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Figure 20.1 The physical properties of waves

(a) Waves vary in *wavelength* (the distance between successive peaks). *Frequency*, the number of complete wavelengths that can pass a point in a given time, depends on the wavelength. The shorter the wavelength, the higher the frequency. Wavelength determines the *pitch* of sound. (b) Waves also vary in *amplitude* (the height from peak to trough). Wave amplitude influences sound *intensity*.

frequency

the number of complete wavelengths that pass a point in a given time (for example, per second).

pitch

a tone's experienced highness or lowness; depends on frequency.

We measure sound amplitude in *decibels*, with zero decibels representing the absolute threshold for hearing. Every 10 decibels correspond to a tenfold increase in sound intensity. Thus, normal conversation (60 decibels) is 10,000 times more intense than a 20-decibel whisper. And a temporarily tolerable 100-decibel passing subway train is 10 billion times more intense than the faintest detectable sound. If prolonged, exposure to sounds above 85 decibels can produce hearing loss. Tell that to football fans of the NFL's Kansas City Chiefs who, in 2014, broke the Guinness World Record for the noisiest stadium at 142 decibels

(Liberman, 2015). Hear today, gone tomorrow.

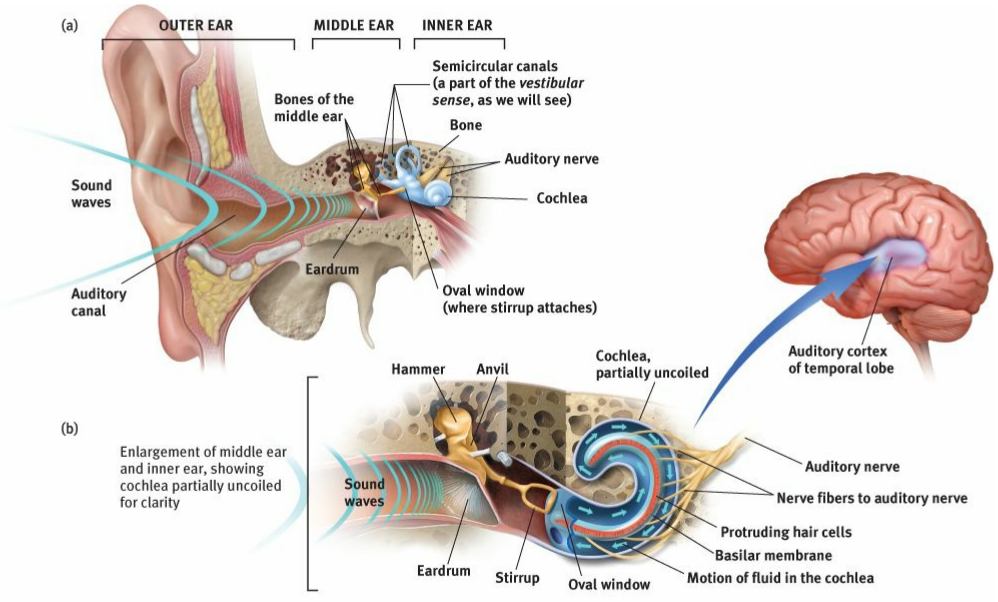
The Ear

20-2 How does the ear transform sound energy into neural messages?

AP® EXAM TIP

Note that both light and sound travel in waves. In each case, understanding the meaning of varying amplitude and length of the waves is important for the AP® exam.

How does vibrating air trigger nerve impulses that your brain can decode as sounds? The process begins when sound waves strike your *eardrum*, causing this tight membrane to vibrate (Figure 20.2).



(a)
OUTER EAR
MIDDLE EAR
INNER EAR
Semicircular canals (a part of the *vestibular sense*, as we will see)
Bones of the middle ear
Bone
Auditory nerve
Cochlea
Sound waves
Eardrum
Auditory canal
Oval window (where stirrup attaches)
Hammer
Anvil
Cochlea, partially uncoiled
Auditory cortex of temporal lobe
(b)
Enlargement of middle ear and inner ear, showing cochlea partially uncoiled for clarity
Sound waves
Auditory nerve
Nerve fibers to auditory nerve
Protruding hair cells
Basilar membrane
Eardrum
Stirrup
Oval window
Motion of fluid in the cochlea

Figure 20.2
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Figure 20.2 Hear here: How we transform sound waves into nerve impulses that our brain interprets

(a) The outer ear funnels sound waves to the eardrum. The bones of the middle ear (hammer, anvil, and stirrup) amplify and relay the eardrum’s vibrations through the oval window into the fluid-filled cochlea. (b) As shown in this detail of the middle and inner ear, the resulting pressure changes in the cochlear fluid cause the basilar membrane to ripple, bending the hair cells on its surface. Hair cell movements trigger impulses at the base of the nerve cells, whose fibers converge to form the auditory nerve. That nerve sends neural messages to the thalamus and on to the auditory cortex.

Susumu Nishinaga/Science Source

Be kind to your inner ear’s hair cells When vibrating in response to sound, the hair cells (shown here lining the cochlea) produce an electrical signal.

In your **middle ear,** a piston made of three tiny bones—the *hammer* (malleus), *anvil* (incus), and *stirrup* (stapes)—picks up the vibrations and transmits them to the **cochlea,** a snail-shaped tube in your **inner ear.**

middle ear

the chamber between the eardrum and cochlea containing three tiny bones (hammer, anvil, and stirrup) that concentrate the vibrations of the eardrum on the cochlea’s oval window.

cochlea [KOHK-lee-uh]

a coiled, bony, fluid-filled tube in the inner ear; sound waves traveling through the cochlear fluid trigger nerve impulses.

inner ear

the innermost part of the ear, containing the cochlea, semicircular canals, and vestibular sacs.

The incoming vibrations then cause the cochlea's membrane-covered opening (the *oval window*) to vibrate, jostling the fluid inside the cochlea. This motion causes ripples in the *basilar membrane,* bending the *hair cells* lining its surface, rather like wheat stalks bending in the wind.

The hair cell movements in turn trigger impulses in adjacent nerve cells, whose axons converge to form the *auditory nerve.* The auditory nerve carries the neural messages to your thalamus and then on to the *auditory cortex* in your brain's temporal lobe.

From vibrating air, to tiny moving bones, to fluid waves, to electrical impulses to the brain: Voilà! You hear!

Perhaps the most intriguing part of the hearing process is the hair cells—"quivering bundles that let us hear" thanks to their "extreme sensitivity and extreme speed" (Goldberg, 2007). A cochlea has 16,000 of them, which sounds like a lot until we compare that with an eye's 130 million or so photoreceptors. But consider a hair cell's responsiveness. Deflect the tiny bundles of *cilia* on its tip by only the width of an atom—imagine!—and the alert hair cell, thanks to a special protein at its tip, will trigger a neural response (Corey et al., 2004).

Damage to the cochlea's hair cell receptors or the auditory nerve can cause **sensorineural hearing loss** (or nerve deafness). With auditory nerve damage, people may hear sound but have trouble discerning what someone is saying (Liberman, 2015).

sensorineural hearing loss

hearing loss caused by damage to the cochlea's receptor cells or to the auditory nerves; the most common form of hearing loss, also called *nerve deafness.*

Occasionally, disease damages hair cell receptors, but more often the culprits are biological changes linked with heredity and aging, and prolonged exposure to ear-splitting noise or music. Sensorineural hearing loss is more common than **conduction hearing loss**, which is caused by damage to the mechanical system—the eardrum and middle ear bones—that conducts sound waves to the cochlea.

conduction hearing loss

a less common form of hearing loss, caused by damage to the mechanical system that conducts sound waves to the cochlea.

The cochlea’s hair cells have been likened to carpet fibers. Walk around on them and they will spring back. But leave a heavy piece of furniture on them and they may never rebound. As a general rule, any noise we cannot talk over (loud machinery, fans screaming at a sports event, music blasting at maximum volume) may be harmful, especially if prolonged and repeated (Roesser, 1998) (**Figure 20.3**). And if our ears ring after such experiences, we have been bad to our unhappy hair cells. As pain alerts us to possible bodily harm, ringing of the ears alerts us to possible hearing damage. It is hearing’s equivalent of bleeding.

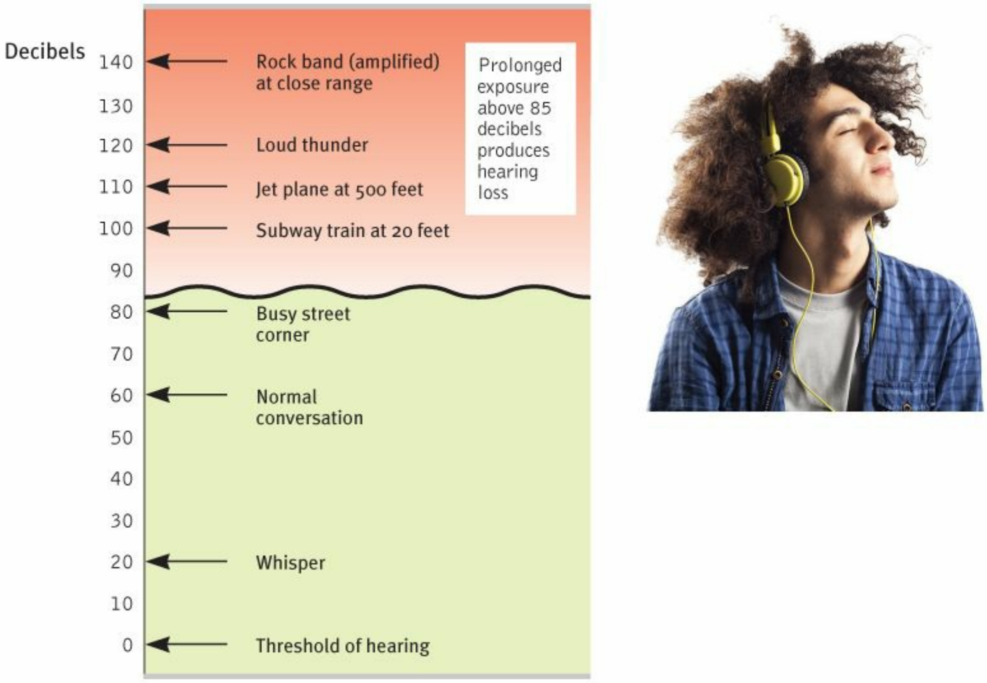

Figure 20.3
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Photo: sebra/Shutterstock

Figure 20.3 The intensity of some common sounds

One study of 3 million Germans found professional musicians with almost four times the normal rate of noise-induced hearing loss (Schink et al., 2014). Some modern headphones block out environmental noise, reducing the need to blast the music at dangerous volumes.

Worldwide, 1.23 billion people are challenged by hearing loss (Global Burden of Disease, 2015). Since the early 1990s, teen hearing loss has risen by a third and now affects 1 in 5 teens (Shargorodsky et al., 2010). Exposure to loud music, both live and through headphones, is a culprit: After three hours of a rock concert averaging 99 decibels, 54 percent of teens reported not hearing as well, and 1 in 4 had ringing in their ears. Teen boys more than teen girls or adults blast themselves with loud volumes for long periods (Zogby, 2006). Males' greater noise exposure may help explain why men's hearing tends to be less acute than women's. But male or female, those who spend many hours in a loud nightclub, behind a power mower, or above a jackhammer should wear earplugs, or they risk needing a hearing aid later.

Nerve deafness cannot be reversed. For now, the only way to restore hearing is a sort of bionic ear—a **cochlear implant.** Some 50,000 people, including some 30,000 children, receive these electronic devices each year (Hochmair, 2013). The implants translate sounds into electrical signals that, wired into the cochlea's nerves, convey information about sound to the brain. When given to deaf kittens and human infants, cochlear implants have seemed to trigger an "awakening" of the pertinent brain area (Klinke et al., 1999; Sireteanu, 1999). These devices can help children become proficient in oral communication (especially if they receive them as preschoolers or ideally before age 1) (Dettman et al., 2007; Schorr et al., 2005). Hearing, like vision, has a *critical period.* Cochlear implants can help restore hearing for most adults, but only if their brain learned to process sound during childhood. The restored hearing can also reduce social isolation and the risk of depression (Mosnier et al., 2015).

cochlear implant

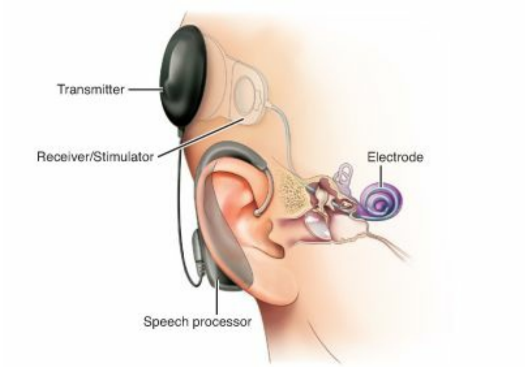
a device for converting sounds into electrical signals and stimulating the auditory nerve through electrodes threaded into the cochlea.

Perceiving Loudness, Pitch, and Location

20-3 How do we detect loudness, discriminate pitch, and locate sounds?

Responding to Loud and Soft Sounds

How do we detect loudness? If you guessed that it's related to the intensity of a hair cell's response, you'd be wrong. Rather, a soft, pure tone activates only the few hair cells attuned to its frequency. Given louder sounds, neighboring hair cells also respond. Thus, your brain interprets loudness from the *number* of activated hair cells.



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Hardware for hearing Cochlear implants work by translating sounds into electrical signals that are transmitted to the cochlea and, via the auditory nerve, relayed to the brain.

If a hair cell loses sensitivity to soft sounds, it may still respond to loud sounds. This helps explain another surprise: Really loud sounds may seem loud to people with or without normal hearing. As a person with hearing loss, I [DM] used to wonder what really loud music must sound like to people with normal hearing. Now I realize it sounds much the same; where we differ is in our perception of soft sounds. This is why we hard-of-hearing people do not want *all* sounds (loud and soft) amplified. We like sound *compressed,* which means harder-to-hear sounds are amplified more than loud sounds (a feature of today's digital hearing aids).

Hearing Different Pitches

▶ Flip It Video: Theories of Hearing

How do we know whether a sound is the high-frequency, high-pitched chirp of a bird or the low-frequency, low-pitched roar of a truck? Current thinking on how we discriminate pitch combines two theories.

- **PLACE THEORY** presumes that we hear different pitches because different sound waves trigger activity at different places along the cochlea’s basilar membrane. Thus, the brain determines a sound’s pitch by recognizing the specific place (on the membrane) that is generating the neural signal. When Nobel laureate-to-be Georg von Békésy (1957) cut holes in the cochleas of guinea pigs and human cadavers and looked inside with a microscope, he discovered that the cochlea vibrated, rather like a shaken bedsheet, in response to sound. High frequencies produced large vibrations near the beginning of the cochlea’s membrane. Low frequencies vibrated more of the membrane and were not so easily localized. So there is a problem: Place theory can explain how we hear high-pitched sounds but not low-pitched sounds.
- **FREQUENCY THEORY** (also called *temporal theory*) suggests an alternative: The brain reads pitch by monitoring the frequency of neural impulses traveling up the auditory nerve. The whole basilar membrane vibrates with the incoming sound wave, triggering neural impulses to the brain at the same rate as the sound wave. If the sound wave has a frequency of 100 waves per second, then 100 pulses per second travel up the auditory nerve. But frequency theory also has a problem: An individual neuron cannot fire faster than 1000 times per second. How, then, can we sense sounds with frequencies above 1000 waves per second (roughly the upper third of a piano keyboard)? Enter the *volley principle:* Like soldiers who alternate firing so that some can shoot while others reload, neural cells can alternate firing. By firing in rapid succession, they can achieve a *combined frequency* above 1000 waves per second.

place theory

in hearing, the theory that links the pitch we hear with the place where the cochlea's membrane is stimulated.

frequency theory

in hearing, the theory that the rate of nerve impulses traveling up the auditory nerve matches the frequency of a tone, thus enabling us to sense its pitch. (Also called *temporal theory*.)

So, place theory and frequency theory work together to enable our perception of pitch. Place theory best explains how we sense *high pitches.* Frequency theory, extended by the volley principle, also explains how we sense *low pitches.* Finally, some combination of place and frequency theories likely explains how we sense *pitches in the intermediate range.*

Locating Sounds

Why don't we have one big ear—perhaps above our one nose? "All the better to hear you with," as the wolf said to Little Red Riding Hood. Thanks to the placement of our two ears, we enjoy stereophonic ("three-dimensional") hearing. Two ears are better than one for at least two reasons (**Figure 20.4**). If a car to your right honks, your right ear will receive a more *intense* sound, and it will receive the sound slightly *sooner* than your left ear.

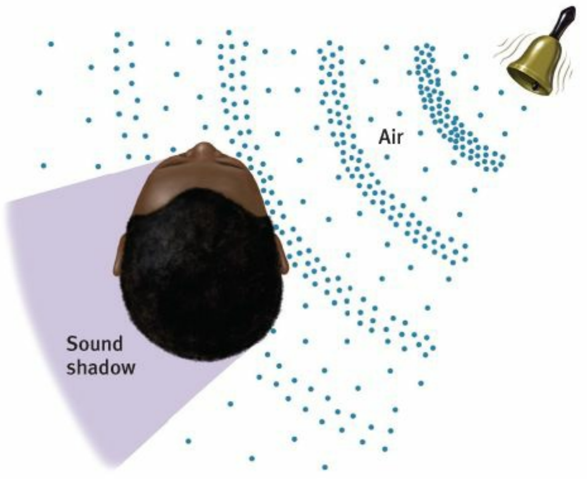

Figure 20.4
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Figure 20.4 How we locate sounds

Sound waves strike one ear sooner and more intensely than the other. From this information, our nimble brain can compute the sound's location. As you might therefore expect, people who lose all hearing in one ear often have difficulty locating sounds.

Because sound travels 761 miles per hour and human ears are but 6 inches apart, the intensity difference and the time lag are extremely small. A just noticeable difference in the direction of two sound sources corresponds to a time difference of just 0.000027 second! Lucky for us, our supersensitive auditory system can detect such minute differences—and locate the sound (Brown & Deffenbacher, 1979; Middlebrooks & Green, 1991).

✓ Check Your Understanding

Ask Yourself

- If you are a hearing person, imagine that you had been born deaf. Do you think your life would be different?

Test Yourself

- What are the basic steps in transforming sound waves into perceived sound?
- The amplitude of a sound wave determines our perception of

_______________ (loudness/pitch).

- The longer the sound waves, the _______________ (lower/higher) their frequency and the _______________ (higher/lower) their pitch.
- Which theory of pitch perception would best explain a symphony audience's enjoyment of a high-pitched piccolo? How about a low-pitched cello?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 20 REVIEW

20-1 What are the characteristics of air pressure waves that we hear as sound?

- Sound waves are bands of compressed and expanded air. Our ears detect these changes in air pressure and transform them into neural impulses, which the brain decodes as sound.
- Sound waves vary in amplitude, which we perceive as differing loudness (measured in decibels), and in *frequency*, which we experience as differing *pitch*.

20-2 How does the ear transform sound energy into neural messages?

- The outer ear (the visible portion of the ear and the auditory canal) funnels sound to the *middle ear* (the chamber between the eardrum and *cochlea*).
- The *inner ear* consists of the cochlea, semicircular canals, and vestibular sacs.
- Sound waves traveling through the auditory canal cause tiny vibrations in the eardrum. The bones of the middle ear (the *hammer, anvil,* and *stirrup*) amplify the vibrations and relay them to the fluid-filled cochlea. Rippling of the basilar membrane, caused by pressure changes in the cochlear fluid, causes movement of the tiny hair cells, triggering neural messages to be sent (via the thalamus) to the auditory cortex in the brain.
- *Sensorineural hearing loss* (or nerve deafness) results from damage to the cochlea’s hair cells or their associated nerves. *Conduction hearing loss* results from damage to the mechanical system that transmits sound waves to the cochlea. *Cochlear implants* can restore hearing for some people.

20-3 How do we detect loudness, discriminate pitch, and locate sounds?

- Our brain interprets loudness from the number of activated hair cells (and louder sounds activate greater numbers of hair cells).
- *Place theory* explains how we hear high-pitched sounds, and *frequency theory* explains how we hear low-pitched sounds. A combination of the two theories explains how we hear pitches in the middle range.
- *Place theory* proposes that our brain interprets a particular pitch by decoding the place where a sound wave stimulates the cochlea’s basilar membrane.
- *Frequency theory* proposes that the brain deciphers the frequency of the neural impulses traveling up the auditory nerve to the brain. By alternating their firing (the volley principle), neural cells enable us to sense sounds with frequencies that exceed the firing speed of an individual neuron.
- Sound waves strike one ear sooner and more intensely than the other. The brain analyzes the minute differences in the sounds received by the two ears and computes the sound’s source.

Multiple-Choice Questions

1. Your friend is playing the low notes on her tuba quite loudly. Which of the following best explains the physical properties of the sound waves?

a. No wavelength; large amplitude
b. Short wavelength; large amplitude
c. Short wavelength; small amplitude
d. Long wavelength; large amplitude
e. No wavelength; small amplitude

2. After being exposed to loud music for many years, which of the following types of deafness is more likely in a musician?

a. Conduction

b. Accommodation
c. Sensorineural
d. Basilar
e. Frequency

3. Which of the following reflects the notion that pitch is related to the stimulation of different areas of the cochlea’s basilar membrane?

a. Place theory
b. Frequency theory
c. Volley principle
d. Sound localization
e. Stereophonic hearing

4. When you listen to music, the sound waves cause your _____ to vibrate first.

a. cochlea
b. hammer, anvil, and stirrup
c. eardrum
d. oval window
e. auditory nerve

Practice FRQs

1. Identify the role of the eardrum, three bones in the middle ear, and oval window in transmitting sound waves before they reach the hair cells.

Answer

1 point: The eardrum will vibrate in response to the sound waves. Page 199

1 point: The three bones (hammer, anvil, and stirrup) in the middle ear transmit sound waves between the eardrum and the oval window. Page 199

1 point: The oval window is the point at which vibrations enter the cochlea. Page 199

2. How are the following activated as you listen to the soundtrack of your favorite film?

- Cochlea
- Auditory nerve
- Auditory cortex

(3 points)

Module 21 The Other Senses

LEARNING TARGETS

- 21-1 Describe the sense of touch.
- 21-2 Discuss the biological, psychological, and social-cultural influences that affect our experience of pain, and explain how placebos and distraction help control pain.
- 21-3 Compare and contrast our senses of taste and smell.
- 21-4 Explain how we sense our body’s position and movement.
- 21-5 Discuss how sensory interaction influences our perceptions, and explain the concept of *embodied cognition.*

Sharks and dogs rely on their outstanding sense of smell, aided by large smell-related brain areas. Our human brain allocates more real estate to seeing and hearing. But extraordinary happenings also occur within our other senses. Without our senses of touch, taste, smell, and body position and movement, we humans would be seriously hampered, and our capacities for enjoying the world would be greatly diminished.

Touch

21-1 How do we sense touch?

Touch, our tactile sense, is vital. Right from the start, touch aids our development. Infant rats deprived of their mother's grooming produce less growth hormone and have a lower metabolic rate—a good way to keep alive until the mother returns, but a reaction that stunts growth if prolonged. Infant monkeys that were allowed to see, hear, and smell—but not touch—their mother became desperately unhappy (Suomi et al., 1976). Premature human babies gain weight faster and go home sooner if they are stimulated by hand massage (Field et al., 2006). As adults, we still yearn to touch—to kiss, to stroke, to snuggle.

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The precious sense of touch As William James wrote in his *Principles of Psychology* (1890), "Touch is both the alpha and omega of affection."

Humorist Dave Barry was perhaps right to jest that your skin "keeps people from seeing the inside of your body, which is repulsive, and it prevents your organs from falling onto the ground." But skin does much more. Touching various spots on the skin with a soft hair, a warm or cool wire, and the point of a pin reveals that some spots are especially sensitive to *pressure*, others to *warmth*, others to *cold*, still others to *pain*. Our "sense of touch" is actually a mix of these four basic and distinct skin senses, and our other skin sensations are variations of pressure, warmth, cold, and pain. For example, stroking adjacent pressure spots creates a tickle. Repeated gentle stroking of a pain spot creates an itching sensation. Touching adjacent cold and pressure spots triggers a sense of wetness (which you can experience by touching dry, cold metal). Stimulating nearby cold and warm spots produces the sensation of hot (**Figure 21.1**).

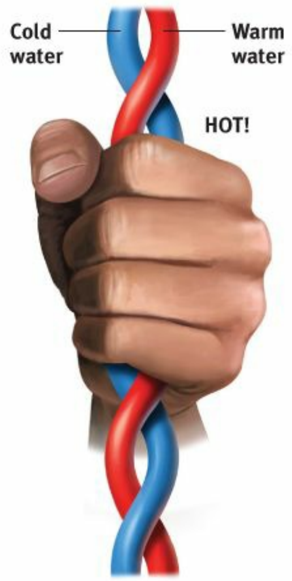

Figure 21.1
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Figure 21.1 Warm + cold = hot

When ice-cold water passes through one coil and comfortably warm water through another, we perceive the combined sensation as burning hot.

Touch sensations involve more than tactile stimulation, however. A self-administered tickle produces less somatosensory cortex activation than does the same tickle from something or someone else (Blakemore et al., 1998). Likewise, a sensual leg caress evokes a different somatosensory cortex response when a heterosexual man believes it comes from an attractive woman rather than a man (Gazzola et al., 2012). Such responses reveal how quickly cognition influences our brain's sensory response.

Pain

21-2 What biological, psychological, and social-cultural influences affect our experience of pain? How do placebos and distraction help control pain?

Be thankful for occasional pain. Pain is your body's way of telling you something has gone wrong. Drawing your attention to a burn, a break, or a sprain, pain orders you to change your behavior—"Stay off that ankle!" Pain also serves psychological purposes. It provides a contrast that amplifies our experiences of pleasure. It enhances our self-awareness. And it arouses others' empathy and promotes social connections (Bastian et al., 2014).

The rare people born without the ability to feel pain may experience severe injury or even death before early adulthood. Without the discomfort that makes us shift position, their joints can fail from excess strain. Without the warnings of pain, infections can run wild and injuries can accumulate (Neese, 1991).

More numerous are those who live with chronic pain, which is rather like an alarm that won't shut off. Persistent backaches, arthritis, headaches, and cancer-related pain prompt two questions: What is pain? How might we control it?

Understanding Pain

Flip It Video: Theories of Pain

Jeff Riedel/Contour/Getty Images

“Pain is a gift.” So said a doctor studying Ashlyn Blocker (right), who has a rare genetic mutation that prevents her from feeling pain. At birth, she didn’t cry. As a child, she ran around for two days on a broken ankle. She has put her hands on a hot machine and burned the flesh off. And she has reached into boiling water to retrieve a dropped spoon. “Everyone in my class asks me about it, and I say, ‘I can feel pressure, but I can’t feel pain.’ *Pain!* I cannot feel it!”

Our experience of pain reflects both *bottom-up* sensations and *top-down* cognition. Pain is a biopsychosocial event (Hadjistavropoulos et al., 2011). As such, pain experiences vary widely, from group to group and from person to person. Viewing pain from the biological, psychological, and social-cultural perspectives can help us better understand it, and also help us cope with it and treat it (**Figure 21.2**).

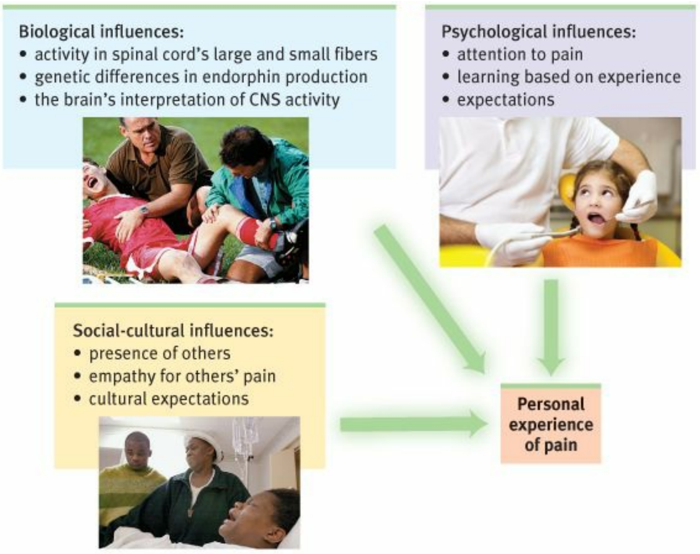

Biological influences:
• activity in spinal cord's large and small fibers
• genetic differences in endorphin production
• the brain's interpretation of CNS activity
Psychological influences:
• attention to pain
• learning based on experience
• expectations
Social-cultural influences:
• presence of others
• empathy for others' pain
• cultural expectations
Personal experience of pain

Figure 21.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Top Left: Barros & Barros/Getty Images; Top Right: Halfpoint/Shutterstock;
Bottom Left: Robert Nickelsberg/Getty Images

Figure 21.2 Biopsychosocial approach to pain

Our experience of pain is much more than the neural messages sent to our brain.

Biological Influences

Pain is a physical event produced by your senses. But pain differs from some of your other sensations. No one type of stimulus triggers pain the way light triggers vision. And no specialized receptors process pain signals the way your retina receptors react to light rays. Instead, sensory receptors called *nociceptors*—mostly in your skin, but also in your muscles and organs—detect hurtful temperatures, pressure, or chemicals (**Figure 21.3**).

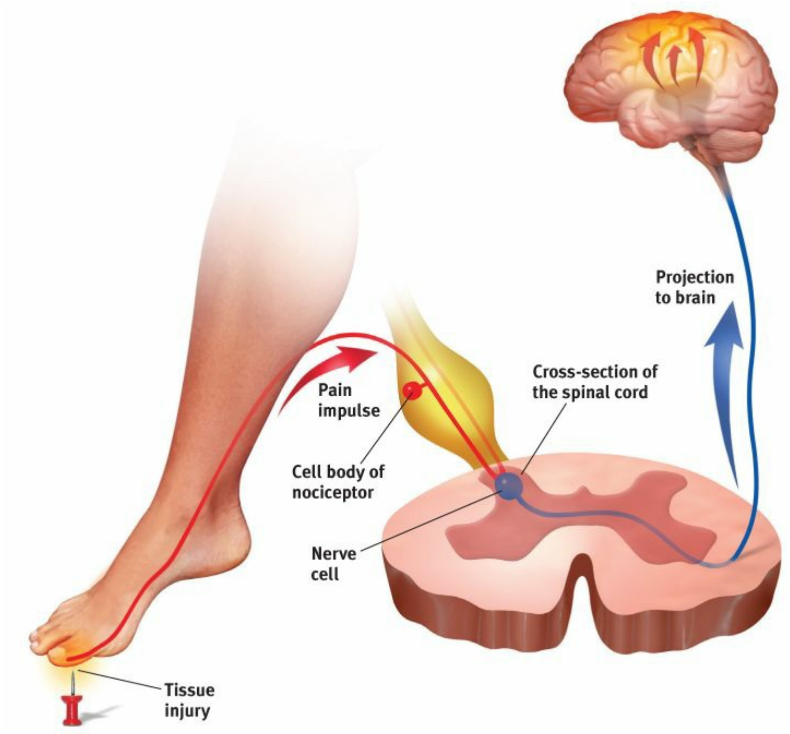

Projection
to brain
Cross-section of
the spinal cord
Pain
impulse
Cell body of
nociceptor
Nerve
cell
Tissue
injury

Figure 21.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 21.3 The pain circuit

Sensory receptors *(nociceptors)* respond to potentially damaging stimuli by sending an impulse to the spinal cord, which passes the message to the brain, which interprets the signal as pain.

Your experience of pain depends in part on the genes you inherited and on your physical characteristics (Gatchel et al., 2007; Reimann et al., 2010). Women are more sensitive to pain than men are (their senses of hearing and smell also tend to be more sensitive) (Ruau et al., 2012; Wickelgren, 2009).

No pain theory can explain all available findings. One useful model, **gate-control theory**, was proposed by psychologist Ronald Melzack and biologist Patrick Wall (1965, 1983; Melzack & Katz, 2013, with support from Foster et al., 2015). The theory suggests that the spinal cord contains a neurological "gate" that controls the transmission of pain messages to the brain.

gate-control theory

the theory that the spinal cord contains a neurological “gate” that blocks pain signals or allows them to pass on to the brain. The “gate” is opened by the activity of pain signals traveling up small nerve fibers and is closed by activity in larger fibers or by information coming from the brain.

Small spinal cord nerve fibers conduct most pain signals. Melzack and Wall theorized that when tissue is injured, the small fibers activate and open the gate. The pain signals can then travel to your brain, and you feel pain. But large-fiber activity (stimulated by massage, electric stimulation, or acupuncture) can close the gate, blocking pain signals. Brain-to-spinal-cord messages can also close the gate. Thus, chronic pain can be treated both by “gate-closing” stimulation, such as massage, and by mental activity, such as distraction (Wall, 2000).

But pain is not merely a physical phenomenon of injured nerves sending impulses to a definable brain or spinal cord area—like pulling on a rope to ring a bell. The brain can also create pain, as it does in *phantom limb sensations* after a limb amputation. Without normal sensory input, the brain may misinterpret and amplify spontaneous but irrelevant central nervous system activity. As the dreamer may see with eyes closed, so 7 in 10 such people feel pain or movement in nonexistent limbs (Melzack, 1992, 2005). Some may even try to lift a cup with a phantom hand, or step off a bed onto a phantom leg. Even those born without a limb sometimes perceive sensations from the absent arm or leg. The brain, Melzack (1998) has surmised, comes prepared to anticipate “that it will be getting information from a body that has limbs.”

Phantoms may haunt other senses too. People with hearing loss often experience the sound of silence: *tinnitus*, the phantom sound of ringing in the ears that’s accompanied by auditory brain activity (Sedley et al., 2015). Those who lose vision to glaucoma, cataracts, diabetes, or macular degeneration may experience phantom sights—nonthreatening hallucinations (Ramachandran & Blakeslee, 1998). Others with nerve damage in the systems for tasting and smelling have experienced phantom tastes or smells, such as ice water that seems sickeningly sweet or fresh air that reeks of rotten food (Goode, 1999). *The point to remember:* We feel, see, hear, taste, and smell with our brain, which can sense even without functioning senses.

Psychological Influences

One powerful influence on our perception of pain is the attention we focus on it. Athletes, focused on winning, may perceive pain differently and play through it.

Reinhold Matay/AP Images

Distracted from the pain After a tackle in the first half of a competitive game, Mohammed Ali Khan (here playing for BK Häcken in white) said he "had a bit of pain" but thought it was "just a bruise." With his attention focused on the game, he played on. In the second half he was surprised to learn from an attending doctor that his leg was broken.

We also seem to edit our *memories* of pain, which often differ from the pain we actually experienced. In experiments, and after painful experiences such as medical procedures or childbirth, people overlook a pain's duration. Their memory snapshots instead record two factors: their pain's *peak* moment (which can lead them to recall variable pain, with peaks, as worse [Chajut et al., 2014; Stone et al., 2005]), and how much pain they felt at the *end*. In one experiment, people immersed one hand in painfully cold water for 60 seconds, and then the other hand in the same painfully cold water for 60 seconds followed by a slightly less painful 30 seconds more (Kahneman et al., 1993). Which experience would you expect they recalled as most painful?

Curiously, when asked which trial they would prefer to repeat, most preferred the 90-second trial, with more net pain—but less pain at the end. Physicians have used this principle with patients undergoing colon exams—lengthening the discomfort by a minute, but lessening its intensity at the end (Kahneman, 1999). Patients experiencing this taper-down treatment later recalled the exam as less painful than did those whose pain ended abruptly. (If, as a painful root canal is ending, the oral surgeon asks if you'd rather go home or have a few more minutes of milder discomfort, there's a case to be made for prolonging your hurt.)

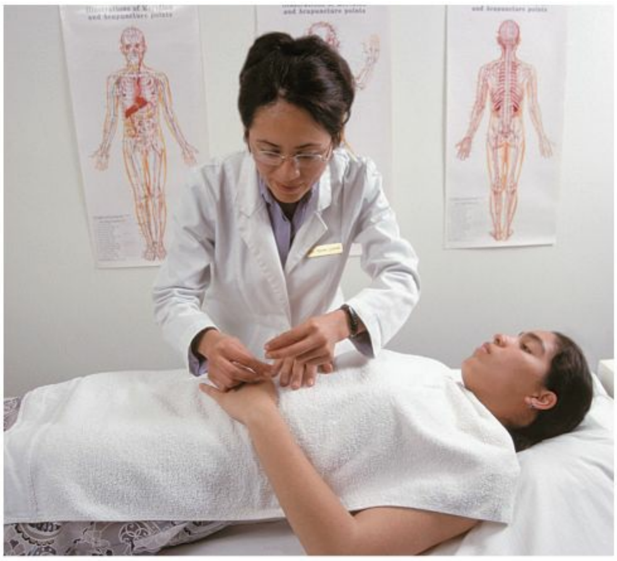
The end of an experience can color our memory of pleasures, too. In one simple experiment, some people, on receiving a fifth and last piece of chocolate, were told it was their "next" one. Others, told it was their "last" piece, liked it better and also rated the whole experiment as being more enjoyable (O'Brien & Ellsworth, 2012). Endings matter.

Social-Cultural Influences

Pain is a product of our attention, our expectations, and also our culture (Gatchel et al., 2007; Reimann et al., 2010). Not surprisingly, then, our perception of pain varies with our social situation and our cultural traditions. We tend to perceive more pain when others seem to be experiencing pain (Symbaluk et al., 1997). This may help explain the apparent social aspects of pain, as when groups of Australian keyboard operators during the mid-1980s suffered outbreaks of severe pain while typing or performing other repetitive work—without any discernible physical abnormalities (Gawande, 1998). Sometimes the pain in sprain is mainly in the brain—literally. When people felt empathy for another's pain, their own brain activity partly mirrored the activity of the actual brain in pain (Singer et al., 2004).

Controlling Pain

If pain is where body meets mind—if it is both a physical and a psychological phenomenon—then it should be treatable both physically and psychologically. Depending on the symptoms, pain control therapies may include drugs, surgery, acupuncture, electrical stimulation, massage, exercise, hypnosis, relaxation training, meditation, and thought distraction.



Gary Conner/Medical Images RM

Acupuncture: A jab well done This acupuncturist is attempting to help this woman gain relief from back pain by using needles on points of the patient's hand.

When in pain, we also benefit from our own built-in pain controls. Our brain releases a natural painkiller—*endorphins*—in response to severe pain or even vigorous exercise. Thus, when we are distracted from pain and soothed by endorphin release, the pain we experience may be greatly reduced. Sports injuries may go unnoticed until the after-game shower. People who carry a gene that boosts the availability of endorphins are less bothered by pain, and their brain is less responsive to pain (Zubieta et al., 2003). Others, who carry a mutated gene that disrupts pain circuit neurotransmission, may be unable to experience pain (Cox et al., 2006). Such discoveries point the way toward future pain medications that mimic these genetic effects.

Placebos

Even *placebos* can help, by dampening the central nervous system's attention and responses to painful experiences—mimicking painkilling drugs (Eippert et al., 2009; Wager & Atlas, 2013). After being injected in the jaw with a stinging saltwater solution, men in one experiment received a placebo they had been told would relieve the pain. It did—they immediately felt better. “Nothing” worked. The men’s belief in the fake painkiller triggered their brain to respond by dispensing endorphins, as revealed by activity in an area that releases natural painkilling opiates (Scott et al., 2007; Zubieta et al., 2005). “Believing becomes reality,” noted one commentator (Thernstrom, 2006), as “the mind unites with the body.”

Another experiment pitted two placebos—fake pills and pretend acupuncture—against each other (Kaptchuk et al., 2006). People with persistent arm pain received either sham acupuncture (with trick needles that retracted without puncturing the skin) or blue cornstarch pills that looked like a medication often prescribed for strain injury. After two months, both groups were reporting less pain, with the fake acupuncture group reporting the greater pain drop. A quarter of those receiving the nonexistent needle pricks and 31 percent of those receiving the fake pills even complained of side effects, such as painful skin or dry mouth and fatigue.

Distraction

Have you ever had a health care professional suggest that you focus on a pleasant image (“Think of a warm, comfortable environment”) or perform some task (“Count backward by 3’s”)? Drawing attention away from the painful stimulation is an effective way to activate brain pathways that inhibit pain and increase pain tolerance (Edwards et al., 2009). For burn victims receiving excruciating wound care, an even more effective distraction is escaping into a computer-generated 3-D world, like the snow scene in **Figure 21.4**. Functional MRI (fMRI) scans have revealed that playing in the virtual reality reduces the brain’s pain-related activity (Hoffman, 2004). Because pain is in the brain, diverting the brain’s attention may bring relief.

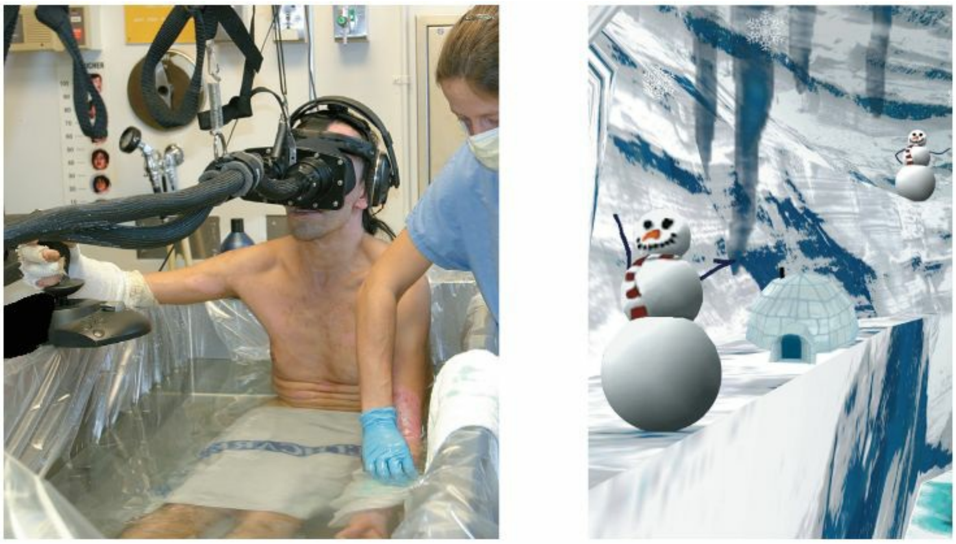


Figure 21.4

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Left: Image by Todd Richards and Arie Bills, U.W., © Hunter Hoffman, www.vrpain.com; Right: Image by Todd Richards and Arie Bills, U.W., © Hunter Hoffman, www.vrpain.com

Figure 21.4 Virtual-reality pain control

For burn victims undergoing painful skin repair, an escape into virtual reality can powerfully distract attention, thus reducing pain and the brain's response to painful stimulation.

> “*Pain is increased by attending to it.*”
>
> *Charles Darwin*, The Expression of the Emotions in Man and Animals, *1872*

Taste

21-3 In what ways are our senses of taste and smell similar, and how do they differ?

Like touch, *gustation*—our sense of taste—involves several basic sensations. Taste's sensations were once thought to be *sweet, sour, salty,* and *bitter,* with all others stemming from mixtures of these four (McBurney & Gent, 1979). Then, as investigators searched for specialized nerve fibers for the four taste sensations, they encountered a receptor for what we now know is a fifth—the savory, meaty taste of *umami,* best experienced as the flavor enhancer monosodium glutamate (MSG).

Tastes exist for more than our pleasure (see **Table 21.1**). Pleasureful tastes attracted our ancestors to energy- or protein-rich foods that enabled their survival. Aversive tastes deterred them from new foods that might be toxic. We see the inheritance of this biological wisdom in today's 2- to 6-year-olds, who are typically fussy eaters, especially when offered new meats or bitter-tasting vegetables, such as spinach and brussels sprouts (Cooke et al., 2003). Meat and plant toxins were both potentially dangerous sources of food poisoning for our ancestors, especially children. Given repeated small tastes of disliked new foods, however, most children begin to accept them (Wardle et al., 2003). We come to like what we eat. Compared with breast-fed babies, German babies bottle-fed vanilla-flavored milk grew up to be adults with a striking preference for vanilla flavoring (Haller et al., 1999). The taste-exposure phenomenon even extends to the womb. In one experiment, babies whose mothers drank carrot juice during the end of pregnancy and the early weeks of nursing developed a liking for carrot-flavored cereal (Mennella et al., 2001). (Module 38 will explore cultural influences on our taste preferences.)

TABLE 21.1 The Survival Functions of Basic Tastes

Taste	Indicates

Sweet	Energy source
Salty	Sodium essential to physiological processes
Sour	Potentially toxic acid
Bitter	Potential poisons
Umami	Proteins to grow and repair tissue

Lauren Burke/Getty Images

Taste is a chemical sense. Inside each little bump on the top and sides of your tongue are 200 or more taste buds, each containing a pore that catches food chemicals. In each taste bud pore, 50 to 100 taste receptor cells project antenna-like hairs that sense food molecules. Some receptors respond mostly to sweet-tasting molecules, others to salty-, sour-, umami-, or bitter-tasting ones. Each receptor transmits its message to a matching partner cell in your brain's temporal lobe (Barretto et al., 2015). Some people have more taste buds than others, enabling them to experience more intense tastes. These "supertasters" can also taste some things that the rest of us cannot (Bartoshuk, 2000).

It doesn't take much to trigger a taste response. If a stream of water is pumped across your tongue, the addition of a concentrated salty or sweet taste for but one-tenth of a second will get your attention (Kelling & Halpern, 1983). When a friend asks for "just a taste" of your soft drink, you can squeeze off the straw after a mere instant.

Taste receptors reproduce themselves every week or two, so if you burn your tongue it hardly matters. However, as you grow older, the number of taste buds decreases, as does taste sensitivity (Cowart, 1981). (No wonder adults enjoy strong-tasting foods that children resist.) Smoking and alcohol use accelerate these declines. Those who have lost their sense of taste have reported that food tastes like "straw" and is hard to swallow (Cowart, 2005).

There's more to taste than meets the tongue. Expectations can influence taste. When told a sausage roll was "vegetarian," nonvegetarian people judged it decidedly inferior to its identical partner labeled "meat" (Allen et al., 2008). In another experiment, when adults were told that a wine cost $90 rather than its real $10 price, they reported it tasting better and a brain area that responds to pleasant experiences showed more activity (Plassmann et al., 2008). Contrary to Shakespeare's presumption (in *Romeo and Juliet*) that "A rose by any other name would smell as sweet," labels matter. And speaking of smell . . . .

Smell

Inhale, exhale. Between birth's first inhale and death's last exhale, about 500 million breaths of life-sustaining air will bathe your nostrils in a stream of scent-laden molecules. The resulting experience of smell —**olfaction**—is strikingly intimate. With every breath, you inhale something of whatever or whoever it is you smell.

olfaction

the sense of smell.

TRY THIS

Impress your friends with your new word for the day: People unable to see are said to experience blindness. People unable to hear experience deafness. People unable to smell experience *anosmia*.

Smell, like taste, is a chemical sense. We smell something when molecules of a substance carried in the air reach a tiny cluster of receptor cells at the top of each nasal cavity (**Figure 21.5**). These 20 million olfactory receptors, waving like sea anemones on a reef, respond selectively—to the aroma of a cake baking, to a wisp of smoke, to a friend's fragrance. Instantly, they alert the brain through their axon fibers.

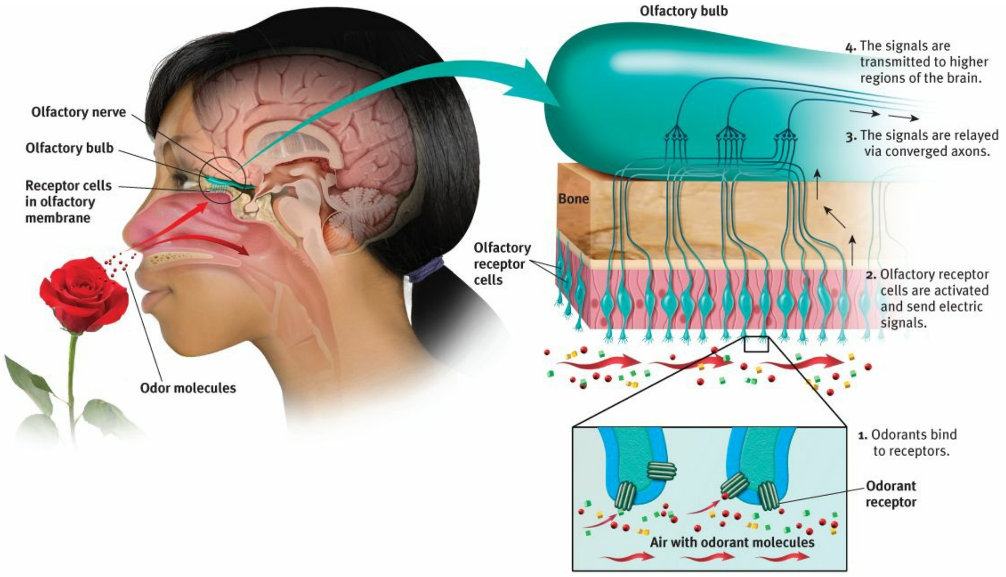
Olfactory nerve
Olfactory bulb
Receptor cells in olfactory membrane
Odor molecules
Olfactory receptor cells
Olfactory bulb
Bone
4. The signals are transmitted to higher regions of the brain.
3. The signals are relayed via converged axons.
2. Olfactory receptor cells are activated and send electric signals.
1. Odorants bind to receptors.
Odorant receptor
Air with odorant molecules

Figure 21.5
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Figure 21.5 The sense of smell

If you are to smell a flower, airborne molecules of its fragrance must reach receptors at the top of your nose. Sniffing swirls air up to the receptors, enhancing the aroma. The receptor cells send messages to the brain's olfactory bulb, and then onward to the temporal lobe's primary smell cortex and to the parts of the limbic system involved in memory and emotion.

Being part of an old, primitive sense, olfactory neurons bypass the brain's sensory control center, the thalamus. Eons before our cerebral cortex had fully evolved, our mammalian ancestors sniffed for food—and for predators. They also smelled molecules called *pheromones*, secreted by other members of their species. Some pheromones serve as sexual attractants.

Odor molecules come in many shapes and sizes—so many, in fact, that it takes many different receptors to detect them. A large family of genes designs the 350 or so receptor proteins that recognize particular odor molecules (Miller, 2004). Linda Buck and Richard Axel (1991) discovered (in work for which they received a 2004 Nobel Prize) that these receptor proteins are embedded on the surface of nasal cavity neurons. As a key slips into a lock, so odor molecules slip into these receptors. Yet we don't seem to have a distinct receptor for each detectable odor. Odors trigger combinations of receptors, in patterns that are interpreted by the olfactory cortex. As the English alphabet's 26 letters can combine to form many words, so odor molecules bind to different receptor arrays, producing at least 1 trillion odors that we could potentially discriminate (Bushdid et al., 2014). It is the combinations of olfactory receptors, which activate different neuron patterns, that allow us to distinguish between the aromas of fresh-brewed and hours-old coffee (Zou et al., 2005).

Animals that have many times more olfactory receptors than we do also use their sense of smell to communicate and to navigate. Long before a shark can see its prey, or a moth its mate, olfactory cues direct their way, as they also do for migrating salmon returning to their home stream. After being exposed in a hatchery to one of two odorant chemicals, returning salmon will later seek whichever stream was spiked with the familiar smell (Barinaga, 1999).

Aided by smell, a mother fur seal returning to a beach crowded with pups will find her own. Human mothers and nursing infants also quickly learn to recognize each other's scents (McCarthy, 1986). As any dog or cat with a good nose could tell us, we each have our own identifiable chemical signature. (One noteworthy exception: A dog will follow the tracks of one identical twin as though they had been made by the other [Thomas, 1974].)

LAYNE BAILEY/AP Images

The nose knows Humans have some 20 million olfactory receptors. A bloodhound has 220 million (Herz, 2007).

The brain knows what the nose doesn't like (Zou et al., 2016). But a smell's appeal—or lack of it—also depends on cultural experiences (Herz, 2001). In the United States, people associate the smell of wintergreen with candy and gum, and they tend to like it. In Great Britain, wintergreen often is associated with medicine, and people find it less appealing. Odors also evoked unpleasant emotions when researchers frustrated Brown University students with a rigged computer game in a scented room (Herz et al., 2004). Later, if exposed to the same odor while working on a verbal task, the students' frustration was rekindled and they gave up sooner than others exposed to a different odor or no odor.

Important as our sense of smell is, it is less acute than our senses of seeing and hearing. Looking out across a garden, we see its forms and colors in exquisite detail and hear a variety of birds singing, yet we smell little of it without sticking our nose into the blossoms. Compared with how we experience and remember sights and sounds, smells are primitive and harder to describe and recall (Richardson & Zucco, 1989; Zucco, 2003). Test it yourself: Which is easier, describing the *sound* of coffee brewing, or the *aroma* of coffee? For most people, it's the sound.

Although we also have trouble recalling odors by name, we have a remarkable capacity to recognize long-forgotten odors and their associated memories (Engen, 1987; Schab, 1991). The smell of the sea, the scent of a perfume, or an aroma of a favorite relative's kitchen can bring to mind a happy time. Our brain's circuitry helps explain an odor's power to evoke feelings and memories (**Figure 21.6**). A hotline runs between the brain area receiving information from the nose and the brain's ancient limbic centers associated with memory and emotion. Thus, when put in a foul-smelling room, people expressed harsher judgments of other people and of immoral acts (such as lying or keeping a found wallet) (Inbar et al., 2011; Schnall et al., 2008). Exposed to a fishy smell, people became more suspicious (Lee et al., 2015). And when riding on a train car with the citrus scent of a cleaning product, people have left behind less trash (de Lange et al., 2012).

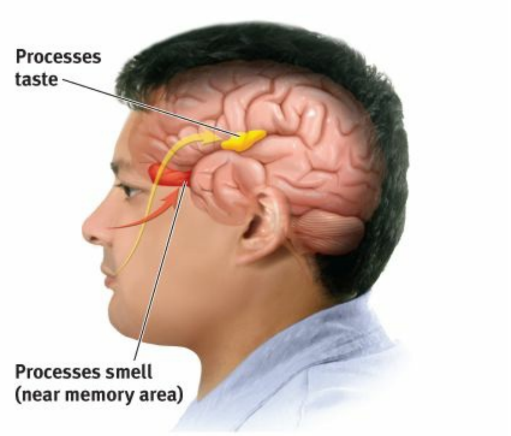

Figure 21.6
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Figure 21.6 Taste, smell, and memory

Information from the taste buds (yellow arrow) travels to an area between the frontal and temporal lobes of the brain. It registers in an area not far from where the brain receives information from our sense of smell, which interacts with taste. The brain's circuitry for smell (red area) also connects with areas involved in memory storage, which helps explain why a smell can trigger a memory.

Gender and age influence our ability to identify scents. Women and young adults have the best sense of smell (Wickelgren, 2009; Wysocki & Gilbert, 1989). Physical condition also matters. Smokers and people with Alzheimer's disease, Parkinson's disease, or alcohol use disorder typically have a diminished sense of smell (Doty, 2001). For all of us, however, the sense of smell tends to peak in early adulthood and gradually declines thereafter.

> “*There could be a stack of truck tires burning in the living room, and I wouldn't necessarily smell it. Whereas my wife can detect a lone spoiled grape two houses away.*”
>
> *Dave Barry, 2005*

Body Position and Movement

21-4 How do we sense our body’s position and movement?

Without sensing your body’s position and movement, you could not put food in your mouth, stand up, or reach out and touch someone. Nor could you perform the “simple” act of taking one step forward. That act requires feedback from, and instructions to, some 200 muscles, and it engages brain power that exceeds the mental activity involved in reasoning. Like all your other voluntary movements, taking a step is possible because of your sense of **kinesthesia**, which keeps you aware of your body parts’ position and movement. You came equipped with millions of position and motion sensors in muscles, tendons, and joints all over your body. These sensors provide constant feedback to your brain. Twist your wrist one degree and your brain receives an immediate update.

kinesthesia [kin-ehs-THEE-zhuh]

our movement sense—our system for sensing the position and movement of individual body arts.

You can momentarily imagine being without sight or sound. Close your eyes or plug your ears, and experience the dark silence. But what would it be like to live without touch or kinesthesia—without being able to sense the positions of your limbs when you wake during the night? Ian Waterman of Hampshire, England, knows. In 1972, at age 19, Waterman contracted a rare viral infection that destroyed the nerves enabling his sense of light touch and of body position and movement. People with this condition report feeling disembodied, as though their body is dead, not real, not theirs (Sacks, 1985). With prolonged practice, Waterman learned to walk and eat—by visually focusing on his limbs and directing them accordingly. But if the lights went out, he would crumple to the floor (Azar, 1998).

Vision interacts with kinesthesia for you, too. Stand with your right heel in front of your left toes. Easy. Now close your eyes and try again. Did you wobble?

A companion **vestibular sense** monitors your head's (and thus your body's) position and movement. The biological gyroscopes for this sense of equilibrium are two structures in your inner ear. The first, your fluid-filled *semicircular canals*, look like a three-dimensional pretzel (see Figure 20.2a). The second structure is the pair of calcium crystal-filled *vestibular sacs*. When your head rotates or tilts, the movement of these organs stimulates hair-like receptors, which send nerve signals to your cerebellum at the back of your brain, enabling you to sense your body position and maintain your balance.

vestibular sense

our sense of body movement and position that enables our sense of balance.

If you twirl around and then come to an abrupt halt, neither the fluid in your semicircular canals nor your kinesthetic receptors will immediately return to their neutral state. The dizzy aftereffect fools your brain with the sensation that you're still spinning. This illustrates a principle that underlies perceptual illusions: Mechanisms that normally give us an accurate experience of the world can, under special conditions, fool us. Understanding how we get fooled provides clues to how our perceptual system works.

© Robert Kanavel

Bodies in space Each of these high school competitive cheer team members can thank her inner ears for the information that enables her brain to monitor her body’s position so expertly.

One little known fact about your vestibular sense: It is super speedy. If you slip, your vestibular sensors automatically and instantly order your skeletal response, well before you have consciously decided how to right yourself.

Try this: Hold one of your thumbs in front of your face then move it rapidly right to left and back. Notice how your thumb blurs (your vision isn’t fast enough to track it). Now hold your thumb still and swivel your head from left to right. Surprise! Your thumb stays clear—because your vestibular system, which is monitoring your head position, speedily moves the eyes. Head moves right, eyes move left. Vision is fast, but the vestibular sense is faster.

Sensory Interaction

21-5 How does sensory interaction influence our perceptions, and what is *embodied cognition?*

We have seen that vision and kinesthesia interact. Actually, none of our senses act alone. All our senses—seeing, hearing, tasting, smelling, touching—eavesdrop on one another, and our brain blends their inputs to interpret the world (Rosenblum, 2013). This is **sensory interaction** at work. One sense can influence another.

sensory interaction

the principle that one sense may influence another, as when the smell of food influences its taste.

Consider how smell sticks its nose into the business of taste. Hold your nose, close your eyes, and have someone feed you various foods. A slice of apple may be indistinguishable from a chunk of raw potato. A piece of steak may taste like cardboard. Without their smells, a cup of cold coffee may be hard to distinguish from a glass of Gatorade. A big part of taste is right under your nose.

Thus, to savor a taste, we normally breathe the aroma through our nose. Like smoke rising in a chimney, food molecules rise into our nasal cavity. This is why food tastes bland when you have a bad cold. Smell can also change our perception of taste: A drink's strawberry odor enhances our perception of its sweetness. Even touch can influence our taste. Depending on its texture, a potato chip "tastes" fresh or stale (Smith, 2011). Smell + texture + taste = flavor. Yet perhaps you have noticed: Despite smell's contribution, flavor feels located in the mouth, not the nose (Stevenson, 2014).

Vision and hearing may similarly interact. A weak flicker of light that we have trouble perceiving becomes more visible when accompanied by a short burst of sound (Kayser, 2007). The reverse is also true: We can hear soft sounds more easily if they are paired with a visual cue. If I [DM], as a person with hearing loss, watch a video with on-screen captions, I have no trouble hearing the words I am seeing. But if I then decide I don’t need the captions and turn them off, I will quickly realize I do need them. The eyes guide the ears (**Figure 21.7**).

Figure 21.7
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Figure 21.7 Sensory interaction

Seeing the speaker forming the words, which Apple’s FaceTime video-chat feature allows, makes those words easier to understand for hard-of-hearing listeners (Knight, 2004).

So our senses do not function in isolation; they interact. But what happens if they disagree? What if our eyes *see* a speaker form one sound but our ears *hear* another sound? Surprise: Our brain may perceive a third sound that blends both inputs. Seeing mouth movements for *ga* while hearing *ba*, we may perceive *da*. This phenomenon is known as the *McGurk effect*, after Scottish psychologist Harry McGurk, who, with his assistant John MacDonald, discovered the effect (1976). For all of us, lip reading is part of hearing.

We have seen that our perceptions have two main ingredients: Our bottom-up sensations and our top-down cognitions (such as expectations, attitudes, thoughts, and memories). In everyday life, sensation and perception are two points on a continuum. It’s not surprising, then, that the brain circuits processing our physical sensations sometimes interact with brain circuits responsible for cognition. The result is **embodied cognition.** We think from within a body. Some examples from playful experiments:

- *Physical warmth may promote social warmth.* After holding a warm drink rather than a cold one, people were more likely to rate someone more warmly, feel closer to them, and behave more generously (IJzerman & Semin, 2009; Williams & Bargh, 2008). Have hot tea with José and iced tea with his identical twin Juan, and you may perceive José to be the warmer brother.
- *Social exclusion can literally feel cold.* After being given the cold shoulder by others, people judged the room to be colder than did those who had been treated warmly (Zhong & Leonardelli, 2008).
- *Judgments of others may also mimic body sensations.* Sitting at a wobbly desk and chair makes others’ relationships, or even one’s own romantic relationship, seem less stable (Forest et al., 2015; Kille et al., 2013).

embodied cognition

the influence of bodily sensations, gestures, and other states on cognitive preferences and judgments.

As we attempt to decipher our world, our brain blends inputs from multiple channels. But in a few select individuals, the brain circuits for two or more senses become joined in a phenomenon called *synesthesia*, where the stimulation of one sense (such as hearing sound) triggers an experience of another (such as seeing color). Early in life, “exuberant neural connectivity” produces some arbitrary associations among the senses, which later are normally—but not always—pruned (Wagner & Dobkins, 2011). Thus, hearing music may activate color-sensitive cortex regions and trigger a sensation of color (Brang et al., 2008; Hubbard et al., 2005). Seeing the number 3 may evoke a taste or color sensation (Newell &

Mitchell, 2016). Those who experience such sensory shifts are known as *synesthetes.*

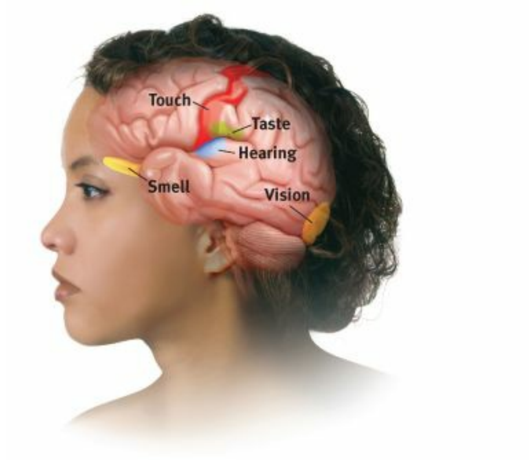
* * *

For a summary of our sensory systems, see **Table 21.2**.

TABLE 21.2 Summarizing the Senses

Sensory System	**Source**	**Receptors**	**Key Brain Areas**
Vision	Light waves striking the eye	Rods and cones in the retina	Occipital lobes
Hearing	Sound waves striking the outer ear	Cochlear hair cells (cilia) in the inner ear	Temporal lobes
Touch	Pressure, warmth, cold, harmful chemicals	Receptors (including painsensitive nociceptors), mostly in the skin, which detect pressure, warmth, cold, and pain	Somatosensory cortex
Taste	Chemical molecules in the mouth	Basic taste receptors for sweet, sour, salty, bitter, and umami	Frontal temporal lobe border
Smell	Chemical molecules breathed in through the nose	Millions of receptors at top of nasal cavities	Olfactory bulb
Body position—kinesthesia	Any change in position of a body part, interacting with vision	Kinesthetic sensors in joints, tendons, and muscles	Cerebellum
Body movement—vestibular	Movement of fluids in the inner ear caused by head/body	Hair-like receptors in the ears' semicircular canals and vestibular sacs	Cerebellum

sense	movement		



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* * *

To feel awe, mystery, and a deep reverence for life, we need look no further than our own perceptual system and its capacity for organizing formless nerve impulses into colorful sights, vivid sounds, and evocative smells. As Shakespeare's Hamlet recognized, "There are more things in Heaven and Earth, Horatio, than are dreamt of in your philosophy." Within our ordinary sensory and perceptual experiences lies much that is truly extraordinary—surely much more than has so far been dreamt of in our psychology.

✓ Check Your Understanding

Ask Yourself

- Have you ever experienced a feeling that you think could be explained by embodied cognition?

Test Yourself

- Which of the following options has NOT been proven to reduce pain?

  a. Distraction
  b. Placebos

c. Phantom limb sensations
d. Endorphins

- ► Where are the kinesthetic receptors and the vestibular sense receptors located?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 21 REVIEW

21-1 How do we sense touch?

- Our sense of touch is actually several senses—pressure, warmth, cold, and pain—that combine to produce other sensations, such as hot.

21-2 What biological, psychological, and social-cultural influences affect our experience of pain? How do placebos and distraction help control pain?

- The biopsychosocial perspective views our perception of pain as the sum of biological, psychological, and social-cultural influences.
- Pain reflects bottom-up sensations (such as input from nociceptors, the sensory receptors that detect hurtful temperatures, pressure, or chemicals) and top-down processes (such as experience, attention, and culture).
- The *gate-control theory* of pain is that a “gate” in the spinal cord either opens to permit pain signals traveling up small nerve fibers to reach the brain or closes to prevent their passage.
- The brain can also create pain, as it does in phantom limb sensations. (This phenomenon can affect the other senses as well.)
- Pain treatments often combine physical and psychological elements, including placebos and distractions. Placebos can diminish the central nervous system’s attention and responses to painful experiences. Distraction can activate neural pathways that inhibit pain and increase pain tolerance.

21-3 In what ways are our senses of taste and smell similar, and how do they differ?

- Taste and smell are both chemical senses.

- Taste is a composite of five basic sensations—sweet, sour, salty, bitter, and umami—and of the aromas that interact with information from the taste receptor cells of the taste buds.
- There are no basic sensations for smell. We have some 20 million olfactory receptor cells, with about 350 different receptor proteins.
- Odor molecules trigger combinations of receptors, in patterns that the olfactory cortex interprets. The receptor cells send messages to the brain’s olfactory bulb, then to the temporal lobe, and to parts of the limbic system.

21-4 **How do we sense our body’s position and movement?**

- Through *kinesthesia*, we sense the position and movement of our body parts.
- We monitor our body’s position and movement and maintain our balance with our *vestibular sense*, which relies on the semicircular canals and vestibular sacs to sense the tilt or rotation of our head.

21-5 **How does sensory interaction influence our perceptions, and what is *embodied cognition?***

- None of our senses operate in a vacuum. We experience *sensory interaction:* Our senses influence one another, and our brain blends the information our senses provide to inform our perceptions. With *synesthesia,* the stimulation of one sense (such as hearing sound) triggers an experience of another (such as seeing color).
- The brain circuits that process physical sensations may interact with brain circuits responsible for cognition, leading to *embodied cognition:* the influence of our body sensations on our cognitive preferences and judgments.

Multiple-Choice Questions

1. Which of the following is the best example of your kinesthetic sense?

a. Touching your nose with your eyes closed
b. Maintaining balance in your chair
c. Detecting both sweet and sour in a beverage
d. Smelling the soup that is cooking for dinner
e. Combining smell and taste together to create flavor

2. The gate-control theory states that “gates” for pain must be open in order for the brain to receive pain messages from the body. Where are these gates located?

a. Thalamus
b. Olfactory nerve
c. Semicircular canals
d. Amygdala
e. Spinal cord

3. Which of the following is the best example of sensory interaction?

a. Finding that despite its delicious aroma, a weird-looking meal tastes awful
b. Finding that food tastes bland when you have a bad cold
c. Finding it difficult to maintain your balance when you have an ear infection
d. Finding that the cold pool water doesn’t feel so cold after a while
e. Finding that the hot peppers get hotter as you consume more of them

4. Which of the following is most closely associated with hair-like receptors in the semicircular canals?

a. Balance
b. Smell
c. Hearing
d. Pain
e. Touch

Practice FRQs

1. Explain the role of the following as you sit down to breakfast:

- Tactile sensations
- Olfactory cells
- Our chemical sense

Answer

1 point: Tactile receptors, especially those for pressure, will let you know that you have sat in your seat. Page 205

1 point: Olfactory cells line the top of the nasal cavity and will allow you to smell breakfast. Page 211

1 point: Taste is a chemical sense and these receptor cells on the tongue detect the sweet, sour, salty, bitter, and umami flavors in the food. Page 209

2. Briefly explain the biopsychosocial perspective on pain and pain treatment.

(2 points)

UNIT IV REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

sensation, p. 158
sensory receptors, p. 158
perception, p. 158
bottom-up processing, p. 158
top-down processing, p. 159
selective attention, p. 159
inattentional blindness, p. 160
change blindness, p. 161
transduction, p. 162
psychophysics, p. 162
absolute threshold, p. 163
signal detection theory, p. 163
subliminal, p. 163
difference threshold, p. 163
priming, p. 165
Weber’s law, p. 165
sensory adaptation, p. 165
perceptual set, p. 169
extrasensory perception (ESP), p. 172
parapsychology, p. 172
wavelength, p. 177
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rods, p. 178

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optic nerve, p. 178

blind spot, p. 179

fovea, p. 179

Young-Helmholtz trichromatic (three-color) theory, p. 181

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feature detectors, p. 183

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phi phenomenon, p. 190

perceptual constancy, p. 191

color constancy, p. 192

perceptual adaptation, p. 195

audition, p. 198

frequency, p. 198

pitch, p. 198

middle ear, p. 199

cochlea [KOHK-lee-uh], p. 199

inner ear, p. 199

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conduction hearing loss, p. 200
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place theory, p. 202
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olfaction, p. 211
kinesthesia [kin-ehs-THEE-zhuh], p. 213
vestibular sense, p. 213
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embodied cognition, p. 214

KEY CONTRIBUTORS TO REMEMBER

Gustav Fechner, p. 163
Ernst Weber, p. 165
David Hubel, p. 182
Torsten Wiesel, p. 182

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. What is the purpose of the iris?

a. To focus light on the retina
b. To process color
c. To allow light into the eye
d. To enable night vision
e. To detect specific shapes

2. _____ are neurons that fire in response to specific edges, lines, angles, and movements.

a. Rods
b. Cones

c. Ganglion cells
d. Feature detectors
e. Bipolar cells

3. Signal detection theory is most closely associated with which perception process?

a. Vision
b. Sensory adaptation
c. Absolute thresholds
d. Smell
e. Context effects

4. Which of the following represents perceptual constancy?

a. We recognize the taste of McDonald's food each time we eat it.
b. In photos of people, the people almost always are perceived as figure and everything else as ground.
c. We know that the color of a printed page has not changed as it moves from sunlight into shadow.
d. From the time they are very young, most people can recognize the smell of a dentist's office.
e. The cold water in a lake doesn't seem so cold after you have been swimming in it for a few minutes.

5. You friend tells you that a cloud looks like your math teacher; you look up and agree. Which principle explains why this is so?

a. Selective attention
b. ESP
c. Perceptual set
d. Shape constancy
e. Bottom-up processing

6. The process by which rods and cones change electromagnetic energy into neural messages is called

a. adaptation.

b. accommodation.
c. parallel processing.
d. transduction.
e. perceptual setting.

7. Which of the following is most likely to influence our memory of a painful event?

a. The overall length of the event
b. The intensity of pain at the end of the event
c. The reason for the pain
d. The amount of rest you’ve had in the 24 hours preceding the event
e. The specific part of the body that experiences the pain

8. Frequency theory relates to which element of the hearing process?

a. The rate at which the basilar membrane vibrates
b. The number of fibers in the auditory nerve
c. The point at which the basilar membrane exhibits the most vibration
d. The decibel level of a sound
e. The number of hair cells in each cochlea

9. Which of the following best represents an absolute threshold?

a. A guitar player knows that his D string has just gone out of tune.
b. A photographer can tell that the natural light available for a photograph has just faded slightly.
c. Your friend amazes you by correctly identifying unlabeled glasses of Coke and Pepsi.
d. A cook can just barely taste the small amount of salt she has added to her soup.
e. Your mom throws out the milk because she says the taste is “off.”

0. Which of the following describes a perception process that the Gestalt psychologists would have been interested in?

a. Depth perception and how it allows us to survive in the world
b. How we notice the various flavor elements in a dish

- c. How an organized whole is formed out of its component pieces
- d. What the smallest units of perception are
- e. The similarities between shape constancy and size constancy

1. Which sensory process are the hammer, anvil, and stirrup involved in?

- a. Detecting intense colors
- b. Processing information related to our sense of balance
- c. Transmitting light energy to ganglion cells
- d. Transmitting sound waves to the cochlea
- e. Smelling the foul odors of the locker room

2. Which of the following might result from a disruption of your vestibular sense?

- a. Inability to detect the position of your arm without looking at it
- b. Loss of the ability to detect bitter tastes
- c. Dizziness and a loss of balance
- d. An inability to detect pain
- e. Loss of color vision

3. The experience of a smooth picture at the movies, even though the actual film is made up thousands of separate pictures is due to

- a. the phi phenomenon.
- b. perceptual set.
- c. stroboscopic movement.
- d. relative motion.
- e. the illusory effect.

4. As you look down the road, the lines of the road seem to come together in the distance, even though you know they do not. Which depth cue explains this phenomenon?

- a. Relative motion
- b. Retinal disparity
- c. Interposition
- d. Light and shadow

e. Linear perspective

5. Which of the following phrases accurately describes top-down processing?

a. The entry-level data captured by our various sensory systems
b. The effect that our experiences and expectations have on perception
c. Our tendency to scan a visual field from top to bottom
d. Our ability to detect letters of a word before we know what the word is
e. The fact that information is processed by the higher regions of the brain before it reaches the lower brain

6. Meghan’s friends seek her out for help with their problems because she can “see the future” and know what the outcome of an event will be before it happens. Her friends think that Meghan has the power of

a. telepathy.
b. clairvoyance.
c. precognition.
d. psychokinesis.
e. sensory interaction.

7. As she looks down the hallway, Elaine is not tricked into thinking that the friend who is closer to her looks larger than the friend who is farther down the hall. Which monocular cue helps her with this understanding?

a. Interposition
b. Linear perspective
c. Interposition
d. Relative height
e. Relative size

8. Because of the repeated exposure to loud noise they experience during their daily jobs, airport ground workers are most susceptible to damage to which of the following?

    a. Olfactory nerve
    b. Cochlea
    c. Ganglion cells
    d. Bipolar cells
    e. Hammer, anvil, and stirrup

9. Which of the following is the best example of sensory interaction?

    a. Simultaneous exposure to warm and cold produces the skin sensation of hot.
    b. Some cones have the ability to detect red and green or blue and yellow light.
    c. You notice a slight flicker of a light when there is a sound that accompanies it.
    d. Pitch perception is explained by the frequency and place theories.
    e. You fail to notice the odd smell of your friend’s room after an hour.

0. After looking at a yellow, black, and green American flag for a minute, you shift your gaze to a white wall. Which of the following best explains why you “see” a red, white, and blue flag when looking at the white wall?

    a. Frequency theory
    b. Young-Helmholtz theory
    c. Opponent-process theory
    d. Ganglion-bipolar theory
    e. Weber’s law

Free-Response Questions

1. While listening to the orchestra as she dances the lead role in Swan Lake, a ballerina concludes her performance with a pirouette, spinning around several times before leaping into the arms of her dance partner.

Discuss how the ballerina relied on the following to successfully complete her performance and how each is important to ensuring that success.

- Kinesthetic sense
- Vestibular sense
- Semicircular canals
- Hearing

Rubric for Free Response Question 1

1 point: Kinesthesia will allow the ballerina to sense the position of different parts of her body as she dances the role. Thus, she will know that she is to start by facing the audience and, although she has spun around several times, she will always be aware of where the audience is, and where to put her feet and arms in order to accomplish the choreography. Page 213

1 point: The vestibular sense enables the dancer to sense her body position and to maintain her balance. Page 213

1 point: Semicircular canals in her inner ear help the ballerina maintain her sense of balance. She needs this balance as she leaps and spins, and her training allows her to use her vestibular sense to maintain balance rather than become dizzy. Page 199 and 213

1 point: The ballerina’s sense of hearing allows her to perceive the music and to dance to the correct rhythm of each piece of music. Page 198

2. Ester is walking to class when she notices someone in the distance suddenly duck into a dark doorway. As she chases the figure, she misjudges the distance and runs into the door and falls down. She laughs when she discovers that the mystery person is her roommate, who was avoiding Ester, because she had borrowed Ester’s favorite sweater without permission and was afraid Ester might be angry.

Use the following terms to explain the perceptual processes involved in this scenario.

- Gate-control theory

- Vestibular sense
- Selective attention
- Signal detection theory
- Binocular cues
- Perceptual set

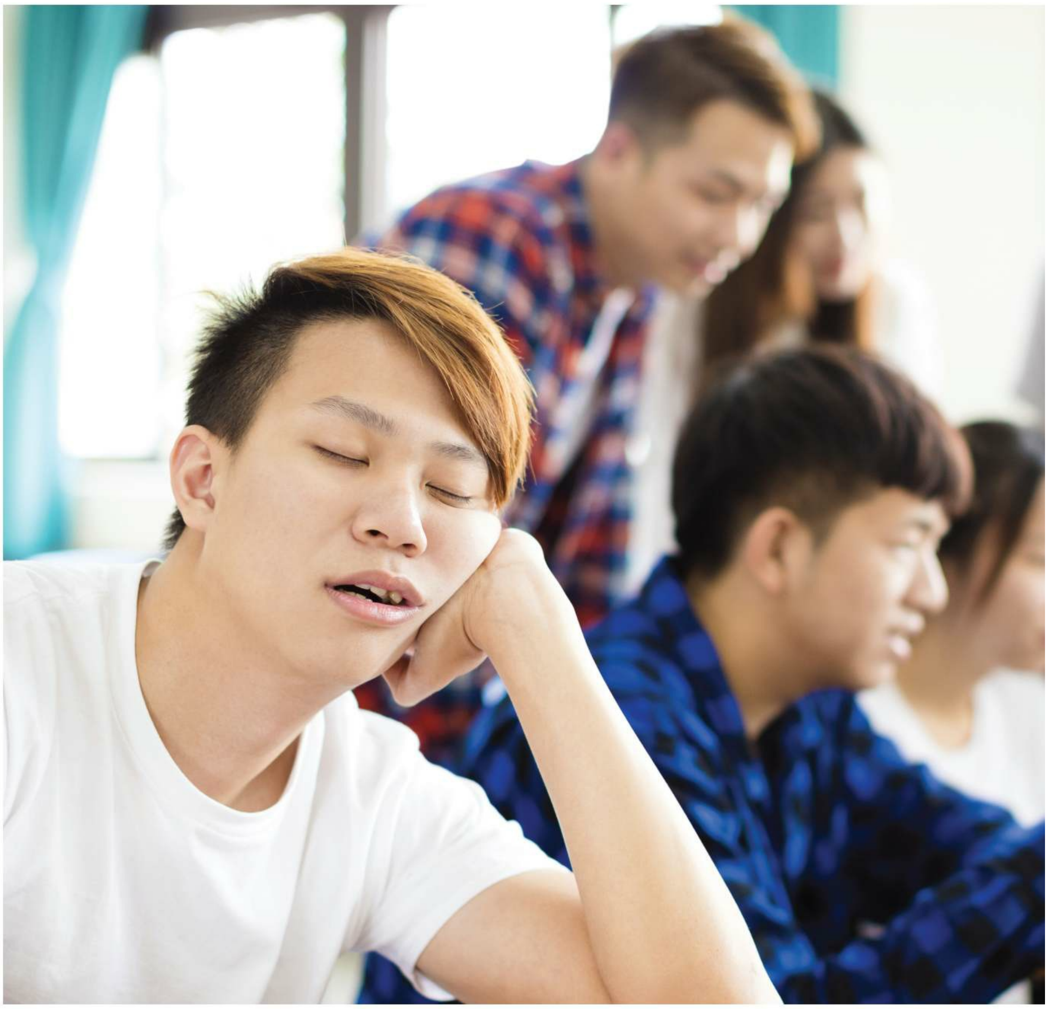
(6 points)

3. Describe, from the beginning of the process to the end, how your brain is perceiving the words you are reading right now. Use the following terms in your answer.

- Transduction
- Top-down processing
- Retina
- Pupil
- Occipital lobe
- Rods
- Feature detectors

(7 points)

UNIT V States of Consciousness



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MODULES

22 Understanding Consciousness and Hypnosis

23 Sleep Patterns and Sleep Theories

24 Sleep Deprivation, Sleep Disorders, and Dreams

25 Psychoactive Drugs

Consciousness can be a funny thing. It offers us weird experiences, as when entering sleep or leaving a dream, and sometimes it leaves us wondering who is really in control. After zoning me [DM] out with nitrous oxide, my dentist tells me to turn my head to the left. My conscious mind resists: “*No way*,” I silently say. “*You can’t boss me around*!” Whereupon my robotic head, ignoring my conscious mind, turns obligingly under the dentist’s control.

During my noontime pickup basketball games, I am sometimes mildly irritated as my body passes the ball while my conscious mind says, “*No, stop! Sarah is going to intercept*!” Alas, my body completes the pass. Other times, as psychologist Daniel Wegner (2002) noted in *The Illusion of Conscious Will*, people believe their conscious mind is controlling their actions when it isn’t. In one experiment, two people jointly controlled a computer mouse. Even when their partner (who was actually the experimenter’s accomplice) caused the mouse to stop on a predetermined square, the participants perceived that *they* had caused it to stop there.

Then there are those times when consciousness seems to split. Sometimes, my [ND’s] mind wanders while giving a well-practiced speech. Reading *Green Eggs and Ham* to one of my [DM’s] preschoolers for the umpteenth time, my obliging mouth could say the words while my mind flitted in and out of the story. And if someone interrupts you mid-text to ask what you’re doing for lunch, it’s not a problem. Your fingers complete the message as you suggest getting tacos.

What do such experiences reveal? Is a drug-induced dental experience akin to people’s experiences with other *psychoactive drugs* (mood- and perception-altering substances)? Does the mind’s wandering while speaking or texting reveal a split in consciousness? And during sleep, when do those weird dream experiences occur, and why? Before considering these questions and more, let’s ask a fundamental question: What is *consciousness?*

Unit V Overview Video

Module 22 Understanding Consciousness and Hypnosis

LEARNING TARGETS

- **22-1 Describe the place of consciousness in psychology's history.**
- **22-2 Define *hypnosis*, and describe how a hypnotist can influence a hypnotized subject.**
- **22-3 Discuss whether hypnosis is an extension of normal consciousness or an altered state.**

Every science has concepts so fundamental they are nearly impossible to define. Biologists agree on what is alive but not on precisely what life is. In physics, *matter* and *energy* elude simple definition. To psychologists, consciousness is similarly a fundamental yet slippery concept.

Defining Consciousness

22-1 What is the place of consciousness in psychology's history?

At its beginning, *psychology* was "the description and explanation of states of consciousness" (Ladd, 1887). But during the first half of the twentieth century, the difficulty of scientifically studying consciousness led many psychologists — including those in the emerging school of *behaviorism* (Module 26) — to turn to direct observations of behavior. By the 1960s, psychology had nearly lost consciousness and was defining itself as "the science of behavior." Consciousness was likened to a car's speedometer: "It doesn't make the car go, it just reflects what's happening" (Seligman, 1991, p. 24).

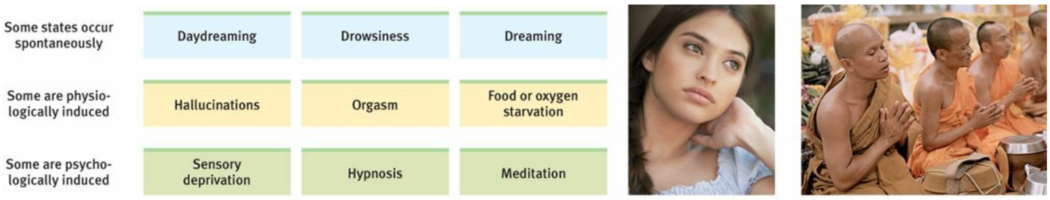
> “*Psychology must discard all reference to consciousness.*”
>
> *Behaviorist John B. Watson (1913)*

After 1960, mental concepts reemerged. Neuroscience advances linked brain activity to sleeping, dreaming, and other mental states. Researchers began studying consciousness altered by hypnosis and drugs. Psychologists of all persuasions were affirming the importance of *cognition*, or mental processes. Psychology was regaining consciousness.

Most psychologists define **consciousness** as our subjective awareness of ourselves and our environment (Feinberg & Mallatt, 2016). As we saw in Module 13, our conscious awareness is one part of the *dual processing* of our two-track minds. Although much of our information processing is conscious, more is unconscious and automatic — outside our awareness. Module 16 highlighted our *selective attention*, which directs the spotlight of our awareness, allowing us to assemble information from many sources as we reflect on our past, adapt to our present, and plan for our future. We are also attentive when we learn a complex concept or behavior. When learning to ride a bike, we focus on obstacles that we have to steer around and on how to use the brakes. With practice, riding a bike becomes semiautomatic, freeing us to focus our attention elsewhere. As we do so, we experience what the early psychologist William James called a continuous “stream of consciousness,” with each moment flowing into the next. Over time, we flit between different *states of consciousness*, including normal waking awareness and various altered states (**Figure 22.1**).

consciousness

our subjective awareness of ourselves and our environment.



Some states occur spontaneously	Daydreaming	Drowsiness	Dreaming
Some are physiologically induced	Hallucinations	Orgasm	Food or oxygen starvation
Some are psychologically induced	Sensory deprivation	Hypnosis	Meditation

Figure 22.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Maria Teijeiro/Getty Images
© Stuart Franklin/Magnum Photos

Figure 22.1 Altered states of consciousness

In addition to normal, waking awareness, consciousness comes to us in altered states, including daydreaming, sleeping, drug-induced hallucinating, and meditating. (For more on meditation, see Module 44.)

AP® EXAM TIP

Note that our modern-day understanding of the unconscious is very different from Sigmund Freud’s theory of the unconscious (Module 55). Freud believed the unconscious was a hiding place for our most anxiety-provoking ideas and emotions, and that uncovering those hidden thoughts could lead to healing. Now, most psychologists simply view the unconscious track as one that operates without awareness. Make sure you keep these two ideas of the unconscious straight. Both interpretations could be seen on the AP® exam.

Hypnosis

22-2 What is *hypnosis,* and how can a hypnotist influence a hypnotized subject?

Imagine you are about to be hypnotized. The hypnotist invites you to sit back, fix your gaze on a spot high on the wall, and relax. In a quiet voice the hypnotist suggests that “Your eyes are growing tired. . . . Your eyelids are becoming heavy . . . now heavier and heavier. . . . They are beginning to close. . . . You are becoming more deeply relaxed. . . . Your breathing is now deep and regular. . . . Your muscles are becoming more and more relaxed. Your whole body is beginning to feel like lead.”

After a few minutes of this *hypnotic induction*, you may experience **hypnosis**. When the hypnotist suggests, “Your eyelids are shutting so tight that you cannot open them even if you try,” it may indeed seem beyond your control to open your eyelids. Told to forget the number 6, you may be puzzled when you count 11 fingers on your hands. Invited to smell a sensuous perfume that is actually ammonia, you may linger delightedly over its pungent odor. Told that you cannot see a certain object, such as a chair, you may indeed report that it is not there, although you manage to avoid the chair when walking around (illustrating once again that two-track mind of yours).

hypnosis

a social interaction in which one person (the hypnotist) suggests to another (the subject) that certain perceptions, feelings, thoughts, or behaviors will spontaneously occur.

But is hypnosis really an *altered* state of consciousness? Let’s start with some frequently asked questions.

Frequently Asked Questions About Hypnosis

Hypnotists have no magical mind-control power. Their power resides in the subjects’ openness to suggestion, their ability to focus on certain images or behaviors (Bowers, 1984). But how open to suggestions are we?

- ***Can anyone experience hypnosis?*** To some extent, we are all suggestible. When people stand upright with their eyes closed and are told that they are swaying back and forth, most will indeed sway a little. In fact, *postural sway* is one of the items assessed on the Stanford Hypnotic Susceptibility Scale. People who respond to such suggestions without hypnosis are the same people who respond with hypnosis (Kirsch & Braffman, 2001).

> “*Hypnosis is not a psychological truth serum and to regard it as such has been a source of considerable mischief.*”
>
> *Researcher Kenneth Bowers (1987)*

  Highly hypnotizable people — the 20 percent who can carry out a suggestion not to smell or react to a bottle of ammonia held under their nose — typically become deeply absorbed in imaginative activities (Barnier & McConkey, 2004; Silva & Kirsch, 1992). Their brains also display altered activity when under hypnosis (Jiang et al., 2016). Many researchers refer to this as *hypnotic ability* — the ability to focus attention totally on a task, to become imaginatively absorbed in it, to entertain fanciful possibilities.

- ***Can hypnosis enhance recall of forgotten events?*** Most people believe (wrongly, as Module 32 will explain) that our experiences are all “in there,” recorded in our brain and available for recall if only we can break through our own defenses (Loftus, 1980). But 60 years of memory research disputes such beliefs. We do not encode everything that occurs around us. We permanently store only some of our experiences, and we may be unable to retrieve some memories we have stored.

AP® EXAM TIP

Psychological research corrects the mistaken popular belief that hypnosis or other methods can be used to tap into a pure and complete memory bank. You will learn much more about how memory really works when you get to Unit VII. The topic of hypnosis has been seen on the AP® exam, so become knowledgeable about it.

FYI

See Module 33 for a more detailed discussion of how people may construct false memories.

"Hypnotically refreshed" memories combine fact with fiction. Since 1980, thousands of people have reported being abducted by UFOs, but most such reports have come from people who are predisposed to believe in aliens, are highly hypnotizable, and have undergone hypnosis (Newman & Baumeister, 1996; Nickell, 1996). Without either person being aware of what is going on, a hypnotist's hints — "Did you hear loud noises?" — can plant ideas that become the subject's pseudomemory.

So, should testimony obtained under hypnosis be admissible in court? American, Australian, and British courts have agreed it should not. They generally ban testimony from witnesses who have been hypnotized (Druckman & Bjork, 1994; Gibson, 1995; McConkey, 1995).

- ***Can hypnosis force people to act against their will?*** Researchers have induced hypnotized people to perform an apparently dangerous act: plunging one hand briefly into fuming "acid," then throwing the "acid" in a researcher's face (Orne & Evans, 1965). Interviewed a day later, these people emphatically denied their acts and said they would never follow such orders.

  Had hypnosis given the hypnotist a special power to control others against their will? To find out, researchers Martin Orne and Frederich Evans unleashed that enemy of so many illusory beliefs — the control group. Orne asked other individuals to *pretend* they were hypnotized. Laboratory assistants, unaware that those in the experiment's control group had not been hypnotized, treated both groups the same. The result? All the *un*hypnotized participants (perhaps believing that the laboratory context assured safety) performed the same acts as those who were hypnotized.

- ***Can hypnosis be therapeutic?*** *Hypnotherapists* try to help patients harness their own healing powers (Baker, 1987). **Posthypnotic suggestions** have helped alleviate headaches, asthma, and stress-related anxiety and skin disorders.

  In one statistical digest of 18 studies, the average client whose therapy was supplemented with hypnosis showed greater improvement than 70 percent of other therapy patients (Kirsch et al., 1995, 1996). Hypnosis seemed especially helpful for the treatment of obesity. However, drug, alcohol, and smoking addictions have not responded well to hypnosis (Nash, 2001). In controlled studies, hypnosis speeds the disappearance of warts, but so do the same positive suggestions given without hypnosis (Spanos, 1991, 1996).

- ***Can hypnosis relieve pain?*** *Yes.* When unhypnotized people put their arm in an ice bath, they felt intense pain within 25 seconds (Elkins et al., 2012; Jensen, 2008). When hypnotized people did the same after being given suggestions to feel no pain, they indeed reported feeling little pain. As some dentists know, light hypnosis can reduce fear, thus reducing hypersensitivity to pain. Hypnosis has also lessened some forms of chronic and disability-related pain (Adachi et al., 2014; Bowker & Dorstyn, 2016).

  Hypnosis inhibits pain-related brain activity. In surgical experiments, hypnotized patients have required less medication, recovered sooner, and left the hospital earlier than unhypnotized control patients (Askay & Patterson, 2007; Hammond, 2008; Spiegel, 2007). Nearly 10 percent of us can become so deeply hypnotized that even major surgery can be performed without anesthesia. Half of us can gain at least some pain relief from hypnosis. Research suggests that pain relief can be maximized by combining a placebo with distraction, and amplifying their effects with hypnosis (Buhl et al., 2012). The surgical use of hypnosis has flourished in Europe, where one Belgian medical team has performed more than 5000 surgeries with a combination of hypnosis, local anesthesia, and a mild sedative (Song, 2006).

posthypnotic suggestion

a suggestion, made during a hypnosis session, to be carried out after the subject is no longer hypnotized; used by some clinicians to help control undesired symptoms and behaviors.

BSIP SA/Alamy

Hypnotherapy This therapy aims to help people uncover problem-causing thoughts and feelings, or to change an unwanted behavior.

Explaining the Hypnotized State

Flip It Video: Theories of Hypnosis

22-3 Is hypnosis an extension of normal consciousness or an altered state?

We have seen that hypnosis involves *heightened suggestibility*. We have also seen that hypnotic procedures do not endow a person with special powers but can sometimes help people overcome stress-related ailments and cope with pain. So, just what *is* hypnosis? Psychologists have proposed two explanations.

Hypnosis as a Social Phenomenon

Our attentional spotlight and interpretations powerfully influence our ordinary perceptions. Might hypnotic phenomena reflect such workings of normal consciousness, as well as the power of social influence (Lynn et al., 1990; Spanos & Coe, 1992)? Advocates of the *social influence theory of hypnosis* believe they do.

Does this mean that subjects consciously fake hypnosis? *No* — like actors caught up in their roles, they begin to feel and behave in ways appropriate for "good hypnotic subjects." The more they like and trust the hypnotist, the more they allow that person to direct their attention and fantasies (Gfeller et al., 1987). "The hypnotist's ideas become the subject's thoughts," explained Theodore Barber (2000), "and the subject's thoughts produce the hypnotic experiences and behaviors." Told to scratch their ear later when they hear the word *psychology*, subjects will likely do so — but only if they think the experiment is still under way. If an experimenter eliminates their motivation for acting hypnotized — by stating that hypnosis reveals their "gullibility" — subjects become unresponsive. Such findings support the idea that hypnotic phenomena are an extension of normal social and cognitive processes.

These views illustrate a principle that Module 75 emphasizes: *An authoritative person in a legitimate context can induce people — hypnotized or not — to perform some unlikely acts.* Or as hypnosis researcher Nicholas Spanos (1982) put it, "The overt behaviors of hypnotic subjects are well within normal limits."

Hypnosis as Divided Consciousness

Other hypnosis researchers believe hypnosis is more than inducing someone to play the role of "good subject." How, they ask, can we explain why hypnotized subjects sometimes carry out suggested behaviors on cue, even when they believe no one is watching (Perugini et al., 1998)? And why does distinctive brain activity in frontal lobe attention systems accompany hypnosis (Oakley & Halligan, 2009, 2013)? In one experiment, deeply hypnotized people were asked to imagine a color, and areas of their brain activated as if they were really seeing the color. To the hypnotized person's brain, mere imagination had become a compelling hallucination (Kosslyn et al., 2000). In another experiment, researchers invited hypnotizable and nonhypnotizable people to say the color of letters. This is an easy task, but it slows if, say, green letters form the conflicting word RED, a phenomenon known as the *Stroop effect* (Raz et al., 2005). When easily hypnotized people were given a suggestion to focus on the color and to perceive the letters as irrelevant gibberish, they were much less slowed by the word-color conflict. (Brain areas that decode words and detect conflict remained inactive.)

These results would not have surprised famed researcher Ernest Hilgard (1986, 1992), who believed hypnosis involves not only social influence but also a special dual-processing state of **dissociation** — a split between different levels of consciousness. Hilgard viewed hypnotic dissociation as a vivid form of everyday mind splits — similar to doodling while listening to a lecture or typing the end of a sentence while starting a conversation. Hilgard argued that when hypnotized people lower their arm into an ice bath, as in **Figure 22.2**, the hypnosis dissociates the sensation of the pain stimulus (of which the subjects are still aware, thanks to their mind's "hidden observer") from the emotional suffering that defines their experience of pain. The ice water therefore feels cold — very cold — but not painful.

dissociation

a split in consciousness, which allows some thoughts and behaviors to occur simultaneously with others.

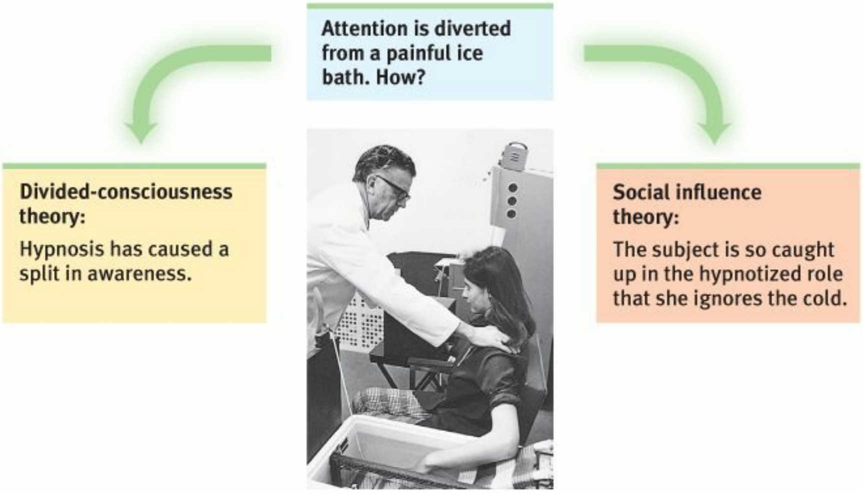

Attention is diverted from a painful ice bath. How?
Divided-consciousness theory:
Hypnosis has caused a split in awareness.
Social influence theory:
The subject is so caught up in the hypnotized role that she ignores the cold.

Figure 22.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Courtesy Elizabeth Jecker

Figure 22.2 Dissociation or role playing?

A hypnotized woman tested by Ernest Hilgard exhibited no pain when her arm was placed in an ice bath. But asked to press a key if some part of her felt the pain, she did so. To Hilgard, this was evidence of dissociation, or divided consciousness. Proponents of social influence theory, however, maintain that people responding this way are caught up in playing the role of "good subject."

Another form of dual processing — selective attention — may also play a role in hypnotic pain relief. PET scans show that hypnosis reduces brain activity in a region that processes painful stimuli, but not in the sensory cortex, which receives the raw sensory input (Rainville et al., 1997). Hypnosis does not block sensory input, but it may block our attention to those stimuli. This helps explain why an injured athlete, caught up in the competition, may feel little or no pain until the game ends.

Although the divided-consciousness theory of hypnosis is controversial, this much seems clear: There is, without doubt, much more to thinking and acting than we are conscious of. Our information processing, which starts with selective attention, is divided into simultaneous conscious and nonconscious realms. In hypnosis as in life, *much of our behavior occurs on autopilot.* We have two-track minds (**Figure 22.3**).

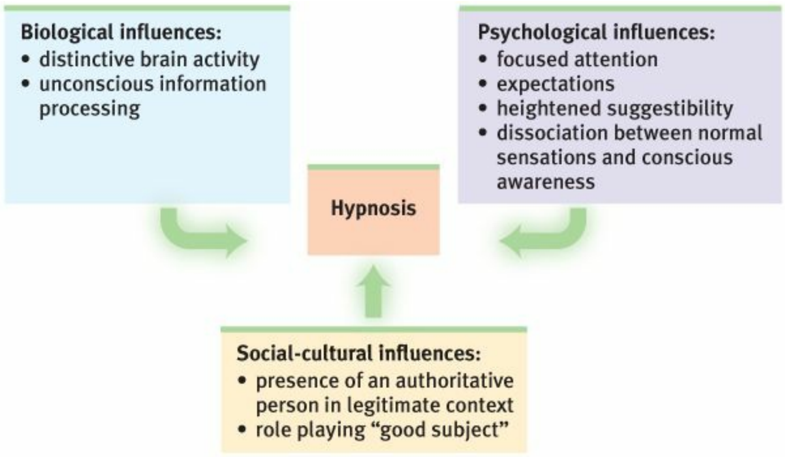

Biological influences:
• distinctive brain activity
• unconscious information processing
Psychological influences:
• focused attention
• expectations
• heightened suggestibility
• dissociation between normal sensations and conscious awareness
Hypnosis
Social-cultural influences:
• presence of an authoritative person in legitimate context
• role playing "good subject"

Figure 22.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 22.3 Biopsychosocial approach to hypnosis

Researchers explore hypnosis from complementary perspectives.

Check Your Understanding

Ask Yourself

- You read in the introduction to this unit about two examples of dissociated consciousness: thinking about something else while reading a child a bedtime story, and talking while texting. Can you think of another example that you have experienced?

Test Yourself

- When is hypnosis potentially harmful, and when can hypnosis be used to help?
- Hilgard believed that hypnosis involves a state of divided consciousness called ___________. His beliefs have been challenged by researchers who suggest ___________ influence is involved.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 22 REVIEW

22-1 What is the place of consciousness in psychology's history?

- After initially claiming consciousness as its area of study in the nineteenth century, psychologists had abandoned it in the first half of the twentieth century, turning instead to the study of observable behavior because they believed consciousness was too difficult to study scientifically.
- Since 1960, under the influence of cognitive psychology and neuroscience, *consciousness* (our awareness of ourselves and our environment) has resumed its place as an important area of research.

22-2 What is *hypnosis*, and how can a hypnotist influence a hypnotized subject?

- *Hypnosis* is a social interaction in which one person (the hypnotist) suggests to another (the subject) that certain perceptions, feelings, thoughts, or behaviors will spontaneously occur.
- Hypnosis does not enhance recall of forgotten events (it may even evoke false memories).
- It cannot force people to act against their will, though hypnotized people, like unhypnotized people, may perform unlikely acts.
- *Posthypnotic suggestions* have helped people harness their own healing powers but have not been very effective in treating addiction. Hypnosis can help relieve pain.

22-3 Is hypnosis an extension of normal consciousness or an altered state?

- Many psychologists believe that hypnosis is a form of normal social influence and that hypnotized people act out the role of "good subject" by following directions given by an authoritative person.

- Other psychologists view hypnosis as a *dissociation* — a split between normal sensations and conscious awareness. Selective attention may also contribute by blocking attention to certain stimuli.

Multiple-Choice Questions

1. Which of the following is true about the study of consciousness in psychology?

a. It was only studied by Sigmund Freud.
b. It has been discredited in favor of studying behaviors.
c. It has been discredited in light of research showing the significant role of the unconscious.
d. It is an important way of studying our two-track minds.
e. Focus has shifted away from other areas to only studying the way that sleep affects our consciousness.

2. Which of the following is most likely to happen under hypnosis?

a. A person will remember a traumatic event from their past that they had forgotten.
b. An adult will regress to acting exactly like they did as a child.
c. A person may be unable to report their grandmother’s name if asked to forget it.
d. An eyewitness to a crime will give a vivid and accurate description of events that they had forgotten.
e. A person will become less open to suggestions.

3. Myla goes to a hypnotist because she is interested in losing weight. Under hypnosis she is told that, later on, when she is hungry, she will eat less than she normally would. The hypnotist is making use of

a. selective attention.
b. the Stroop effect.
c. social influence.
d. a hallucination.

e. a posthypnotic suggestion.

4. Which of the following is the term most closely associated with the split in consciousness that allows some thoughts and behaviors to occur simultaneously with others?

a. Consciousness
b. Hypnosis
c. Hallucination
d. Dissociation
e. Meditation

Practice FRQs

1. Your friend agrees to be hypnotized as part of a school fundraiser and ends up behaving in a way that she later has difficulty believing. Describe how the following theories would explain her actions while hypnotized:

- Social influence theory
- Divided-consciousness theory

Answer

1 point: The social influence theory would explain that your friend did as the hypnotist suggested so that she would be successfully playing the role of being hypnotized. Pages 227–228

1 point: The divided-consciousness theory would explain that your friend was aware on some level of what she was doing while hypnotized, even if she does not later remember. Pages 227–228

2. According to the biopsychosocial approach, identify a biological, a psychological, and a social-cultural influence on hypnosis.

(3 points)

Module 23 Sleep Patterns and Sleep Theories

LEARNING TARGETS

- 23-1 Describe *sleep* as a state of consciousness.
- 23-2 Describe how our biological rhythms influence our daily functioning.
- 23-3 Describe the biological rhythm of our sleeping and dreaming stages.
- 23-4 Explain how biology and environment interact in our sleep patterns.
- 23-5 Describe sleep's functions.

23-1 **What is *sleep?***

Sleep — the irresistible tempter to whom we inevitably succumb. Sleep — the equalizer of teachers and teens. Sleep — sweet, renewing, mysterious sleep. While sleeping, you may feel "dead to the world," but you are not. Even when you are deeply asleep, your perceptual window is open a crack. You move around on your bed, but you manage not to fall out. Although the roar of my [ND's] neighborhood garbage truck leaves me undisturbed, my baby's cry will shatter my sleep. The sound of your name can also cause your unconscious body to perk up. EEG recordings confirm that the brain's auditory cortex responds to sound stimuli even during sleep (Kutas, 1990). And when you sleep, as when awake, you process most information outside your conscious awareness.

sleep
a periodic, natural loss of consciousness — as distinct from unconsciousness resulting from a coma, general anesthesia, or hibernation. (Adapted from Dement, 1999.)

Now, by recording the brain waves and muscle movements of sleeping participants, and by observing and occasionally waking them, researchers are solving some of sleep's deepest mysteries. Perhaps you can anticipate some of their discoveries. Are the following statements true or false?

1. When people dream of performing some activity, their limbs often move in concert with the dream.
2. Older adults sleep more than young adults.
3. Sleepwalkers are acting out their dreams.
4. Sleep experts recommend treating insomnia with an occasional sleeping pill.
5. Some people dream every night; others seldom dream.

> “*I love to sleep. Do you? Isn't it great? It really is the best of both worlds. You get to be alive and unconscious.*”
>
> *Comedian Rita Rudner, 1993*

All these statements (adapted from Palladino & Carducci, 1983) are *false*. To see why, read on.

Biological Rhythms and Sleep

Like the ocean, life has its rhythmic tides. Over varying time periods, our bodies fluctuate, and with them, our minds. Let’s look more closely at two of those biological rhythms — our 24-hour biological clock and our 90-minute sleep cycle.

Circadian Rhythm

23-2 How do our biological rhythms influence our daily functioning?

The rhythm of the day parallels the rhythm of life — from our waking at a new day’s birth to our nightly return to what Shakespeare called “death’s counterfeit.” Our bodies roughly synchronize with the 24-hour cycle of day and night thanks to an internal biological clock called the **circadian rhythm** (from the Latin *circa*, “about,” and *diem*, “day”). As morning nears, body temperature rises; it then peaks during the day, dips for a time in early afternoon (when many people take siestas or drink a caffeinated beverage), and begins to drop again in the evening. Thinking and memory improve as we approach our daily peak in circadian arousal. Have you ever pulled an all-nighter? Do you recall feeling groggiest in the middle of the night but with a sense of new alertness after the arrival of your normal wake-up time?

circadian [ser-KAY-dee-an] rhythm

our biological clock; regular bodily rhythms (for example, of temperature and wakefulness) that occur on a 24-hour cycle.

FYI

Some students sleep like the fellow who stayed up all night to see where the Sun went. (Then it dawned on him.)

Age and experience can alter our circadian rhythm. Most teens and young adults are evening-energized “owls,” with performance improving across the day (May & Hasher, 1998). Most older adults are morning-loving “larks,” with performance declining as the day wears on. By mid-evening, when the night has hardly begun for many young adults, retirement homes are typically quiet. After about age 20 (slightly earlier for women), we begin to shift from being owls to being larks (Roenneberg et al., 2004). Women become more morning oriented as they have children and also as they transition to menopause (Leonhard & Randler, 2009; Randler & Bausback, 2010). In general, night owls tend to be smart and creative (Giampietro & Cavallera, 2007). Morning types tend to do better in school, take more initiative, be more punctual, and be less vulnerable to depression (Preckel et al., 2013; Randler, 2008, 2009; Werner et al., 2015).

Eric Isselee/Shutterstock

Peter Chadwick/Science Source

Sleep Stages

23-3 What is the biological rhythm of our sleeping and dreaming stages?

Sooner or later, sleep overtakes us all, and consciousness fades as different parts of our brain's cortex stop communicating (Massimini et al., 2005). Yet the sleeping brain remains active and has its own biological rhythm.

About every 90 minutes, we cycle through distinct sleep stages. This fact came to light when 8-year-old Armond Aserinsky went to bed one night in 1952. His father, Eugene, a University of Chicago graduate student, needed to test an electroencephalograph machine he had repaired that day (Aserinsky, 1988; Seligman & Yellen, 1987). Placing electrodes near Armond's eyes to record the rolling eye movements then believed to occur during sleep, Aserinsky watched the machine go wild, tracing deep zigzags on the graph paper. Could the machine still be broken? As the night proceeded and the activity recurred, Aserinsky realized that the periods of fast, jerky eye movements were accompanied by energetic brain activity. Awakened during one such episode, Armond reported having a dream. Aserinsky had discovered what we now know as **REM sleep** (*r*apid *e*ye *m*ovement sleep).

REM sleep

rapid eye movement sleep; a recurring sleep stage during which vivid dreams commonly occur. Also known as *paradoxical sleep*, because the muscles are relaxed (except for minor twitches) but other body systems are active.

FYI

Dolphins, porpoises, and whales sleep with one side of their brain at a time (Miller et al., 2008).

Similar procedures used with thousands of volunteers showed the cycles were a normal part of sleep (Kleitman, 1960). To appreciate these studies, imagine yourself as a participant. As the hour grows late, you feel sleepy and yawn in response to reduced brain metabolism. (Yawning, which is also socially contagious, stretches your neck muscles and increases your heart rate, which increases your alertness [Moorcroft, 2003].) When you are ready for bed, a researcher comes in and tapes electrodes to your scalp (to detect your brain waves), on your chin (to detect muscle tension), and just outside the corners of your eyes (to detect eye movement; **Figure 23.1**). Other devices will record your heart rate, respiration rate, and genital arousal.

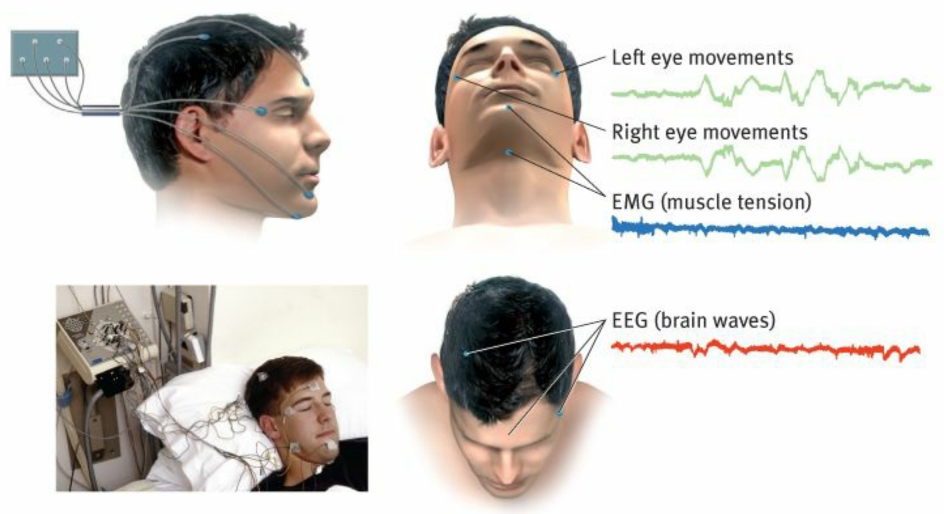


Figure 23.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Hank Morgan/Science Source

Figure 23.1 Measuring sleep activity

Sleep researchers measure brain-wave activity, eye movements, and muscle tension with electrodes that pick up weak electrical signals from the brain, eyes, and facial muscles (Dement, 1978).

When you are in bed with your eyes closed, the researcher in the next room sees on the EEG the relatively slow **alpha waves** of your awake but relaxed state (**Figure 23.2**). As you adapt to all this equipment, you grow tired and, in an unremembered moment, slip into sleep (**Figure 23.3**). This transition is marked by the slowed breathing and the irregular brain waves of non-REM stage 1 sleep. Using the American Academy of Sleep

Medicine classification of sleep stages, this type of non–rapid eye movement sleep — **NREM sleep** — is called *NREM-1* (Silber et al., 2007).

alpha waves

the relatively slow brain waves of a relaxed, awake state.

NREM sleep

non-rapid eye movement sleep; encompasses all sleep stages except for REM sleep.

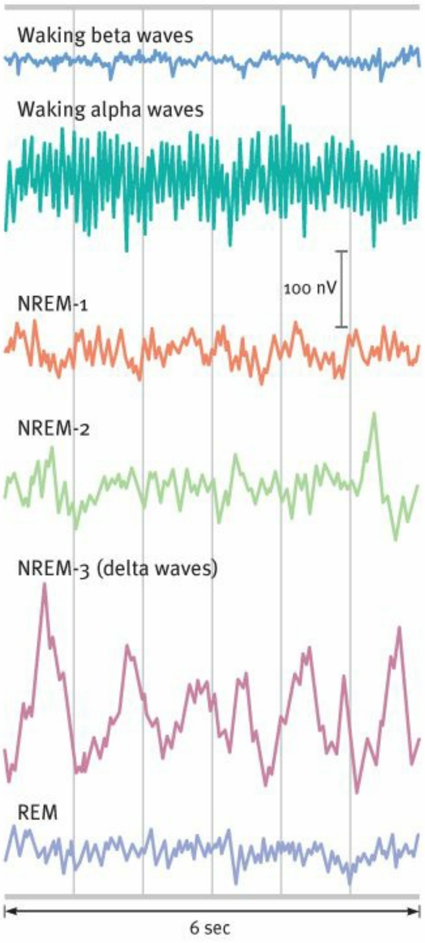


Figure 23.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Rebecca Spencer, University of Massachusetts, assisted with this illustration.

Figure 23.2 Brain waves and sleep stages

The beta waves of an alert, waking state and the regular alpha waves of an awake, relaxed state differ from the slower, larger delta waves of deep NREM-3 sleep. Although the rapid REM sleep waves resemble the near-waking NREM-1 sleep waves, the body is more internally aroused during REM sleep than during NREM (*non-REM*) sleep.

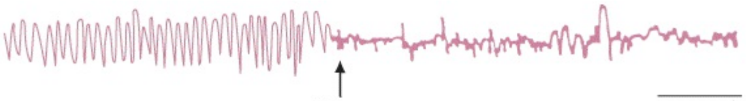


Figure 23.3

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Figure 23.3 The moment of sleep

We seem unaware of the moment we fall into sleep, but someone watching our brain waves could tell (Dement, 1999).

In one of his 15,000 research participants, William Dement (1999) observed the moment the brain's perceptual window to the outside world slammed shut. Dement asked a sleep-deprived young man with eyelids taped open to press a button every time a strobe light flashed in his eyes (about every 6 seconds). After a few minutes the young man missed one. Asked why, he said, "Because there was no flash." But there was a flash. He missed it because (as his brain activity revealed) he had fallen asleep for 2 seconds, missing not only the flash 6 inches from his nose but also the awareness of the abrupt moment of entry into sleep.

During this brief NREM-1 sleep you may experience fantastic images resembling **hallucinations** — sensory experiences that occur without a sensory stimulus. You may have a sensation of falling (at which moment your body may suddenly jerk) or of floating weightlessly. These **hypnagogic sensations** may later be incorporated into your memories. People who claim they were abducted by aliens — often shortly after getting into bed — commonly recall being floated off of or pinned down on their beds (Clancy, 2005; McNally, 2012).

hallucinations

false sensory experiences, such as seeing something in the absence of an external visual stimulus.

hypnagogic sensations

bizarre experiences, such as jerking or a feeling of falling or floating weightlessly, while transitioning to sleep.

You then relax more deeply and begin about 20 minutes of *NREM-2* sleep, with its periodic *sleep spindles* — bursts of rapid, rhythmic brain-wave activity. Although you could still be awakened without too much difficulty, you are now clearly asleep.

Then you transition to the deep sleep of *NREM-3*. During this slow-wave sleep, which lasts for about 30 minutes, your brain emits large, slow **delta waves** and you are hard to awaken. Have you ever said, “That thunder was so loud last night!” only to have a friend respond, “What thunder?” Those who missed the storm may have been in delta sleep. (It is at the end of this stage that children may wet the bed.)

delta waves

the large, slow brain waves associated with the deep sleep of NREM-3.

REM Sleep

▶ **Flip It Video: REM sleep**

About an hour after you first fall asleep, a strange thing happens. Rather than continuing in deep slumber, you ascend from your initial sleep dive. Returning through NREM-2 (where you’ll ultimately spend about half your night), you enter the most intriguing of the four sleep phases — REM sleep (**Figure 23.4**). For about 10 minutes, your brain waves become rapid and saw-toothed, more like those of the nearly awake NREM-1 sleep. But unlike NREM-1, during REM sleep your heart rate rises, your breathing becomes rapid and irregular, and every half-minute or so your closed eyes dart around in momentary bursts of activity. These eye movements announce the beginning of a dream — often emotional, usually story-like, and richly hallucinatory. Dreams aren't real, but REM sleep tricks your brain into responding as if you are actually watching a real scene (Andrillon et al., 2015). Because anyone watching a sleeper's eyes can notice these REM bursts, it is amazing that science was ignorant of REM sleep until 1952.

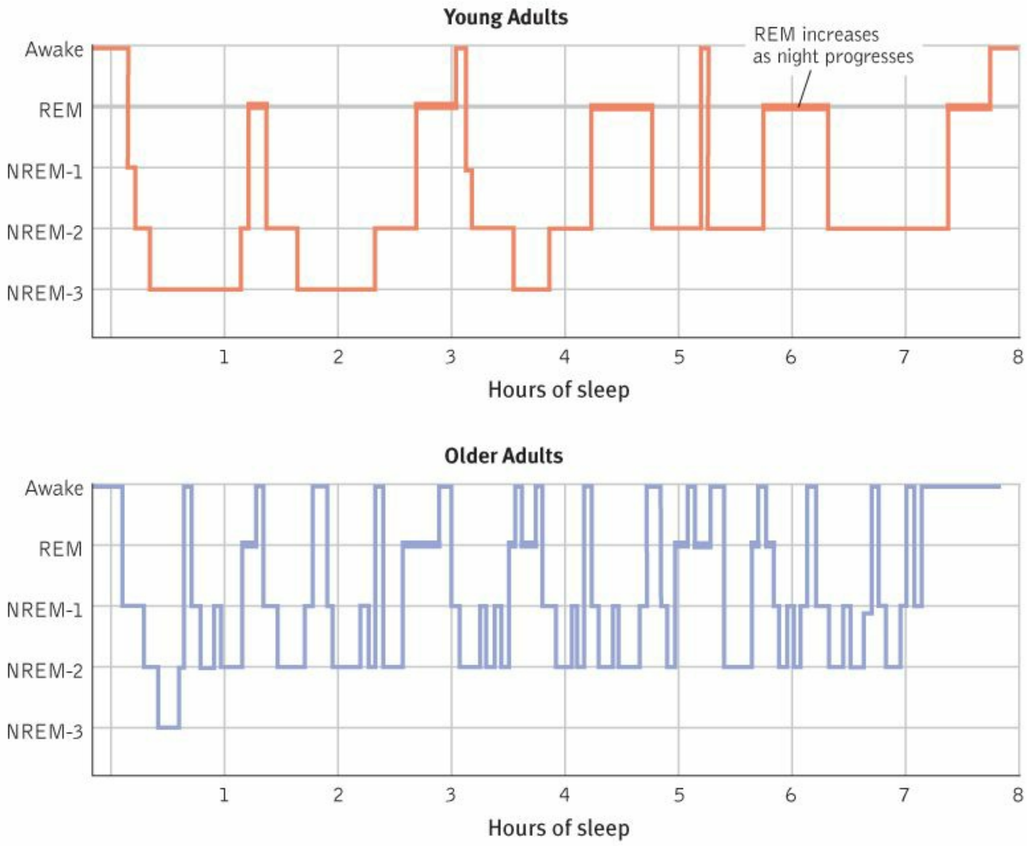

Figure 23.4
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Figure 23.4 The stages in a typical night's sleep

People pass through a multistage sleep cycle several times each night, with the periods of deep sleep diminishing and REM sleep periods increasing in duration. As people age, sleep becomes more fragile, with awakenings common among older adults (Kamel & Gammack, 2006; Neubauer, 1999).

Except during very scary dreams, your genitals become aroused during REM sleep. You have an erection or increased vaginal lubrication, regardless of whether the dream's content is sexual (Karacan et al., 1966).

Men’s common “morning erection” stems from the night’s last REM period, often just before waking.

ScienceCartoonsPlus.com

“Boy are my eyes tired! I had REM sleep all night long.”

AP® EXAM TIP

Study this cycle of sleep carefully. One common mistake that students make is to believe that REM sleep comes directly after deep NREM-3 sleep. As you can see, it does not. Generally, NREM-2 follows NREM-3. Then comes REM. This clarification will help for the AP® exam.

During REM sleep, your brain’s motor cortex is active, but your brainstem blocks its messages. This leaves your muscles relaxed, so much so that, except for an occasional finger, toe, or facial twitch, you are essentially paralyzed. Moreover, you cannot easily be awakened. (This immobility may occasionally linger as you awaken from REM sleep, producing a disturbing experience of *sleep paralysis* [Santomauro & French, 2009].) REM sleep is thus sometimes called *paradoxical sleep:* The body is internally aroused, with waking-like brain activity, yet asleep and externally calm.

FYI

People rarely snore during dreams. When REM starts, snoring stops.

FYI

Horses, which spend 92 percent of each day standing and can sleep standing, must lie down for REM sleep (Morrison, 2003).

The sleep cycle repeats itself about every 90 minutes for younger adults (with shorter, more frequent cycles for older adults). As the night goes on, deep NREM-3 sleep grows shorter and disappears, and REM and NREM-2 sleep periods get longer (see Figure 23.4). By morning, we have spent 20 to 25 percent of an average night's sleep—some 100 minutes—in REM sleep. In sleep lab studies, 37 percent of participants have reported rarely or never having dreams that they "can remember the next morning" (Moore, 2004). Yet even they, more than 80 percent of the time, could recall a dream after being awakened during REM sleep. We spend about 600 hours a year experiencing some 1500 dreams, or more than 100,000 dreams over a typical lifetime — dreams swallowed by the night but not acted out, thanks to REM's protective paralysis.

Uriel Sinai/Getty Images

Safety in numbers? Communal sleeping provides added protection for those whose safety depends on vigilance. With each soldier cycling through the sleep stages independently, it is very likely that at any given time at least one of them will be awake or easily wakened in the event of a threat.

What Affects Our Sleep Patterns?

23-4 How do biology and environment interact in our sleep patterns?

True or false? “Everyone needs 8 hours of sleep.” *False.* Newborns often sleep two-thirds of their day, most adults no more than one-third (with some thriving on fewer than 6 hours nightly, others racking up 9 or more). There is more to our sleep differences than age. Some are awake between nightly sleep periods — sometimes called “first sleep” and “second sleep” (Randall, 2012). And some find that a 15-minute midday nap is as effective as another hour of nighttime sleep (Horne, 2011).

FYI

If our natural circadian rhythm were attuned to a 23-hour cycle, would we instead need to discipline ourselves to stay up later at night and sleep in longer in the morning?

Sleep patterns are genetically influenced. Researchers are tracking the sleep-regulating genes in humans and other animals (Hayashi et al., 2015; Mackenzie et al., 2015). Sleep patterns are also culturally influenced. In Britain, Canada, Germany, Japan, and the United States, adults average 7 hours of sleep a night on workdays, and 7 to 8 hours on other days (NSF, 2013). The weeknight sleep of many students and workers falls short of this average, however (NSF, 2008). Earlier school start times, more extracurricular activities, and a lack of parent-set bedtime leads American adolescents to get less sleep than their Australian counterparts (Short et al., 2013). Thanks to modern lighting, shift work, and social media diversions, many who might have gone to bed at 9:00 p.m. a century ago are now up until 11:00 p.m. or later. With sleep, as with waking behavior, biology and environment interact.

Whether for work or play, bright light tweaks the circadian clock by activating light-sensitive retinal proteins. These proteins control the circadian clock by triggering signals to the brain’s **suprachiasmatic nucleus (SCN)** — a pair of grain-of-rice-sized, 10,000-cell clusters in the hypothalamus (**Figure 23.5**). The SCN does its job partly by causing the brain’s pineal gland to decrease its production of the sleep-inducing hormone *melatonin* in the morning and to increase it in the evening (Chang et al., 2015; Gandhi et al., 2015).

suprachiasmatic nucleus (SCN)

a pair of cell clusters in the hypothalamus that controls circadian rhythm. In response to light, the SCN causes the pineal gland to adjust melatonin production, thus modifying our feelings of sleepiness.

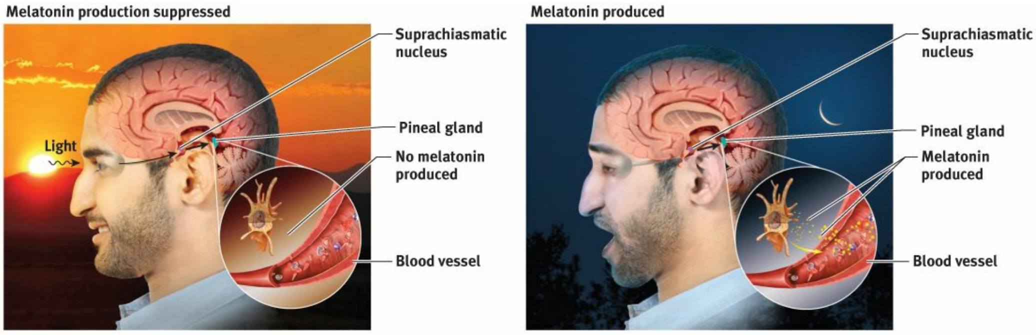

Melatonin production suppressed
Light
Suprachiasmatic nucleus
Pineal gland
No melatonin produced
Blood vessel
Melatonin produced
Suprachiasmatic nucleus
Pineal gland
Melatonin produced
Blood vessel

Figure 23.5
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 23.5 The biological clock

Light striking the retina signals the suprachiasmatic nucleus (SCN) to suppress the pineal gland’s production of the sleep hormone melatonin. At night, the SCN quiets down, allowing the pineal gland to release melatonin into the bloodstream.

Being bathed in (or deprived of) light disrupts our 24-hour biological clock (Czeisler et al., 1999; Dement, 1999). Night-shift workers may experience a chronic state of *desynchronization.* As a result, they become more likely to develop fatigue, stomach problems, heart disease, and, for women, breast cancer (Knutsson & Bøggild, 2010; Lin et al., 2015; Puttonen et al., 2009). Curiously — given that our ancestors’ body clocks were attuned to the rising and setting sun of the 24-hour day — many of today’s young adults adopt something closer to a 25-hour day by staying up too late to get 8 hours of sleep. For this, we can thank (or blame)

Thomas Edison, inventor of the light bulb. Approximately 90 percent of Americans report using a light-emitting electronic device one hour before going to sleep (Chang et al., 2015). Such artificial light delays sleep.

FYI

A circadian disadvantage: One study of a decade’s 24,121 Major League Baseball games found that teams who had crossed three time zones before playing a multiday series had nearly a 60 percent chance of losing their first game (Winter et al., 2009). A follow-up study found the greatest effect after eastbound travel (Song et al., 2017).

Sleep often eludes those who stay up late and sleep in on weekends, and then go to bed earlier on Sunday evening in preparation for the new school week (Oren & Terman, 1998). Like New Yorkers readjusting after a trip to California, they experience “social jet lag.” For North Americans who fly to Europe and need to be up when their circadian rhythm cries “*SLEEP*,” bright light (spending the next day outdoors) helps reset the biological clock (Czeisler et al., 1986, 1989; Eastman et al., 1995).

Check Your Understanding

Ask Yourself

- How does your need for sleep compare with that of others you know? Do you see age-related differences among your friends and family?

Test Yourself

- What are the four sleep stages, and in what order do we normally travel through those stages?
- Can you match the cognitive experience with the sleep stage?

1. NREM-1	a. story-like dream
2. NREM-3	b. fleeting images
3. REM	c. minimal awareness

- The _______________ nucleus helps monitor the brain’s release of melatonin, which affects our _______________ rhythm.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Why Do We Sleep?

23-5 What are sleep’s functions?

So, our sleep patterns differ from person to person and from culture to culture. But why do we have this need for sleep? Psychologists offer five possible reasons:

1. ***Sleep protects.*** When darkness shut down the day’s hunting, gathering, and travel, our distant ancestors were better off asleep in a cave, out of harm’s way. Those who didn’t wander around dark cliffs were more likely to leave descendants. This fits a broader principle: A species’ sleep pattern tends to suit its ecological niche (Siegel, 2009). Animals with the greatest need to graze and the least ability to hide tend to sleep less. Animals also sleep less, with no ill effects, during times of mating and migration (Siegel, 2012). (For a sampling of animal sleep times, see **Figure 23.6**.)
2. ***Sleep helps us recuperate.*** Sleep helps restore the immune system and repair brain tissue. Sleep gives resting neurons time to repair themselves, while pruning or weakening unused connections (Ding et al., 2016; Li et al., 2017). Bats and other animals with high waking metabolism burn a lot of calories, producing *free radicals*, molecules that are toxic to neurons. Sleep sweeps away this toxic waste (Xie et al., 2013). Think of it this way: When consciousness leaves your house, workers come in to clean, saying “Good night. Sleep tidy.”
3. ***Sleep helps restore and rebuild our fading memories of the day’s experiences.*** To sleep is to strengthen. Sleep *consolidates* our memories by replaying recent learning and strengthening neural connections (Pace-Schott et al., 2015; Yang et al., 2014). It reactivates recent experiences stored in the hippocampus and shifts them for permanent storage elsewhere in the cortex (Racsmány et al., 2010; Urbain et al., 2016). Adults, children, and infants trained to perform tasks therefore recall them better after a night’s sleep, or even after a

short nap, than after several hours awake (Friedrich et al., 2015; Sandoval et al., 2017; Seehagen et al., 2015). Older adults' more frequently disrupted sleep also disrupts memory consolidation (Boyce et al., 2016; Pace-Schott & Spencer, 2011). "Sleep less, think worse," summarizes one research team (Frenda & Fenn, 2016). After sleeping well, older people remember more of recently learned material (Drummond, 2010). Sleep, it seems, strengthens memories.

> “*Corduroy pillows make headlines.*”
>
> *Anonymous*

4. ***Sleep feeds creative thinking.*** Dreams can inspire noteworthy artistic and scientific achievements, such as the dreams that clued chemist August Kekulé to the structure of benzene (Ross, 2006) and inspired medical researcher Carl Alving (2011) to invent the vaccine patch. More commonplace is the boost that a complete night's sleep gives to our thinking and learning. After working on a task, then sleeping on it, people solve difficult problems more insightfully than do those who stay awake (Barrett, 2011; Sio et al., 2013). They also are better at spotting connections among novel pieces of information (Ellenbogen et al., 2007; Whitehurst et al., 2016). To think smart and see connections, it often pays to ponder a problem just before bed and then sleep on it.
5. ***Sleep supports growth.*** During slow-wave sleep, which occurs mostly in the first half of a night's sleep, the pituitary gland releases human growth hormone, which is necessary for muscle development.

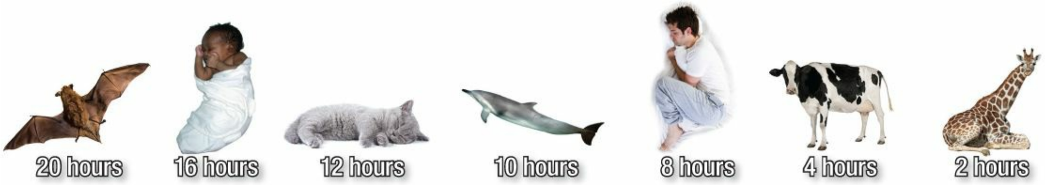


Figure 23.6
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
First Photo: Kruglov Orda/Shutterstock; Second Photo: Andrew D. Myers; Third Photo: Utekhina Anna/Shutterstock; Fourth Photo: Steffen Foerster/Shutterstock; Fifth Photo: RubberBall Productions/Getty Images; Sixth Photo: Eric Isselee/Shutterstock; Seventh Photo: pandapaw/Shutterstock
Data from NIH, 2010.

Figure 23.6 Animal sleep time

Would you rather be a brown bat and sleep 20 hours a day or a giraffe and sleep 2 hours a day?

A regular full night's sleep can "*dramatically* improve your athletic ability," report James Maas and Rebecca Robbins (2010). REM sleep and NREM-2 sleep — which occur mostly in the final hours of a long night's sleep — also help strengthen the neural connections that build enduring memories, including the "muscle memories" learned while practicing tennis or shooting baskets. Sleep promotes both a strong body and a strong mind. Well-rested athletes have faster reaction times, more energy, and greater endurance, and teams that build 8 to 10 hours of daily sleep into their training show improved performance. One study of Stanford University men's basketball players found that when their average sleep increased 110 minutes per night over the course of several weeks, their sprint times decreased, and their free throw and 3-point shooting percentages both increased 9 percent (Mah et al., 2011). Swimmer Conner Jaeger, who won a silver medal at the 2016 Olympics, takes sleep seriously. "Part of our training that we really just started to focus on," he said, "is sleep" (Mayberry, 2016).

TIMOTHY A. CLARY/AFP/Getty Images

Ample sleep supports skill learning and high performance This was the experience of Olympic gold medalist Sarah Hughes.

Maas, who has been a sleep consultant for college and professional athletes and teams, also advised basketball’s Orlando Magic and figure skating’s Sarah Hughes to cut their early-morning practices as part of a recommended sleep regimen. Soon thereafter, Hughes’ performance scores increased, ultimately culminating in her 2002 Olympic gold medal.

✓ Check Your Understanding

Ask Yourself

- Would you consider yourself a night owl or a morning lark? When do you usually feel most energetic? What time of day works best for you to study?

Test Yourself

- What are five proposed reasons for our need for sleep?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 23 REVIEW

23-1 What is *sleep*?

- *Sleep* is the periodic, natural loss of consciousness — as distinct from unconsciousness resulting from a coma, general anesthesia, or hibernation. (Adapted from Dement, 1999.)

23-2 How do our biological rhythms influence our daily functioning?

- Our bodies have an internal biological clock, roughly synchronized with the 24-hour cycle of night and day.
- This *circadian rhythm* appears in our daily patterns of body temperature, arousal, sleeping, and waking. Age and experiences can alter these patterns, resetting our biological clock.

23-3 What is the biological rhythm of our sleeping and dreaming stages?

- We cycle through four distinct sleep stages about every 90 minutes:
    - NREM-1 sleep is the brief, near-waking sleep with irregular brain waves we enter (after leaving the *alpha waves* of being awake and relaxed); *hallucinations* (sensations such as falling or floating) may occur.
    - NREM-2 sleep, in which we spend about half our sleep time, with its characteristic sleep spindles (bursts of rhythmic brain waves).
    - NREM-3 sleep is deep sleep, in which large, slow *delta waves* are emitted.
    - *REM (rapid eye movement) sleep* is described as a paradoxical sleep stage because of internal arousal but external calm (near paralysis). It includes most dreaming and lengthens as the night goes on.

- During a normal night’s sleep, NREM-3 sleep shortens and REM and NREM-2 sleep lengthens.

23-4 How do biology and environment interact in our sleep patterns?

- Biology — our circadian rhythm as well as our age and our body’s production of melatonin (influenced by the brain’s *suprachiasmatic nucleus*) — interacts with cultural expectations and individual behaviors to determine our sleeping and waking patterns.
- Being bathed in (or deprived of) light disrupts our 24-hour biological clock. Night-shift workers may experience a chronic state of desynchronization.

23-5 What are sleep’s functions?

- Sleep may have played a protective role in human evolution by keeping people safe during potentially dangerous periods.
- Sleep also helps restore and repair damaged neurons.
- Sleep consolidates our memories by replaying recent learning and strengthening neural connections.
- Sleep promotes creative problem solving the next day.
- During slow-wave sleep, the pituitary gland secretes a human growth hormone necessary for muscle development.

Multiple-Choice Questions

1. Which of the following represents a circadian rhythm?

a. A burst of growth occurs during puberty.
b. The sleep cycle is roughly 90 minutes long.
c. Our bodies sleep-wake on a roughly 24 hour schedule.
d. Our bodies become paralyzed when we enter REM sleep.
e. Pulse rate increases when we exercise.

2. Shortly after falling asleep, James experiences the hypnagogic sensation of falling. It is most likely that he is in which stage of sleep?

a. Alpha
b. NREM-1
c. NREM-2
d. NREM-3
e. REM

3. What is the role of the suprachiasmatic nucleus in sleep?

a. It induces REM sleep every 90 minutes.
b. It causes the pineal gland to increase the production of melatonin.
c. It causes the pituitary gland to increase the release of human growth hormone.
d. It causes the pituitary gland to decrease the release of human growth hormone.
e. It causes the pineal gland to decrease the production of melatonin.

4. Which of the following sleep theories would best explain why athletes perform better after a full night's sleep?

a. Memory
b. Protection
c. Growth
d. Recuperation
e. Creativity

5. Patrick has just entered REM sleep. Which of the following is he likely to experience?

a. Body paralysis
b. The sensation of falling
c. Delta waves
d. Alpha waves
e. Sleep spindles

Practice FRQs

1. Researchers have identified the brain waves associated with waking and sleeping stages. Explain which stage a person is in if researchers detect the following brain waves:
    - Alpha waves
    - Sleep spindles
    - Delta waves

Answer

1 point: Alpha waves are present in an awake, relaxed state just before falling asleep. Page 232

1 point: Sleep spindles appear during NREM-2 sleep. Page 234

1 point: Delta waves appear during our deepest stage of sleep, NREM-3. Page 234

2. A friend believes that sleep is not that important and that he can go several days without sleep with no ill effects. Use the following theories about why we sleep to explain some negative effects your friend might experience after missing a couple nights of sleep:
    - Sleep helps us recuperate.
    - Sleep helps us restore memories.
    - Sleep supports growth.

(3 points)

Module 24 Sleep Deprivation, Sleep Disorders, and Dreams

LEARNING TARGETS

- 24-1 Describe the effects of sleep loss, and identify the major sleep disorders.
- 24-2 Describe the most common content of dreams, and identify the functions theorists have proposed for dreams.

Sleep Deprivation and Sleep Disorders

24-1 How does sleep loss affect us, and what are the major sleep disorders?

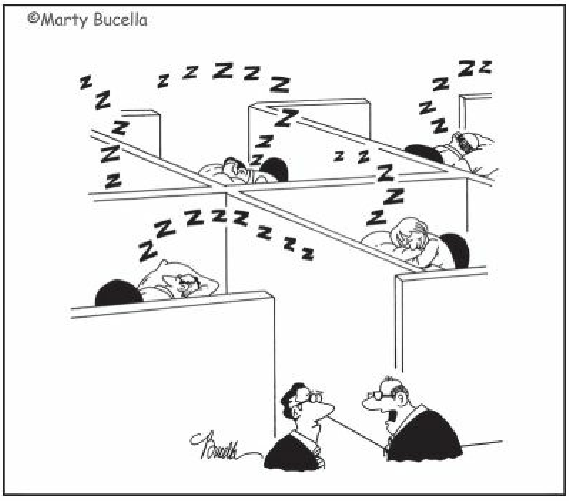
When our body yearns for sleep but does not get it, we begin to feel terrible. Trying to stay awake, we will eventually lose. It’s easy to spot students who have stayed up late: They are often fighting the “nods” (their heads bobbing downward in seconds-long “microsleeps”) as they fight to stay awake.

In the tiredness battle, sleep always wins. In 1989, Michael Doucette was named America’s Safest Driving Teen. In 1990, while driving home from college, he fell asleep at the wheel and collided with an oncoming car, killing both himself and the other driver. Michael’s driving instructor later acknowledged never having mentioned sleep deprivation and drowsy driving (Dement, 1999).

Effects of Sleep Loss

Today, more than ever, our sleep patterns leave us not only sleepy but drained of energy and feelings of well-being. This tiredness tendency has grown so steadily that some researchers have labeled current times the “Great Sleep Recession” (Keyes et al., 2015). After several 5-hour nights, we accumulate a sleep debt that cannot be satisfied by one long sleep. “The brain keeps an accurate count of sleep debt for at least two weeks,” reported sleep researcher William Dement (1999, p. 64).

Obviously, then, we need sleep. Sleep commands roughly one-third of our lives — some 25 years, on average. Allowed to sleep unhindered, most adults will sleep at least 9 hours a night (Coren, 1996). With that much sleep, we awaken refreshed, sustain better moods, and perform more efficiently and accurately. The U.S. Navy and the National Institutes of Health have demonstrated the benefits of unrestricted sleep in experiments in which volunteers spent 14 hours daily in bed for at least a week. For the first few days, the volunteers averaged 12 hours of sleep or more per day, apparently paying off a sleep debt that averaged 25 to 30 hours. That accomplished, they then settled back to 7.5 to 9 hours nightly and felt energized and happier (Dement, 1999). In one Gallup survey (Mason, 2005), 63 percent of adults who reported getting the sleep they needed also reported being "very satisfied" with their personal life (as did only 36 percent of those needing more sleep). And when 909 working women reported on their daily moods, the researchers were struck by what mattered little (such as money, so long as the person was not battling poverty), and what mattered a lot: less time pressure at work and a good night's sleep (Kahneman et al., 2004).



© 2011 Marty Bucella

"Maybe 'Bring Your Pillow to Work Day' wasn't such a good idea."

In one survey, 28 percent of high school students acknowledged falling asleep in class at least once a week (NSF, 2006). College and university students are also sleep deprived; 69 percent in one national survey reported "feeling tired" or "having little energy" on at least several days during the two previous weeks (AP, 2009). The going needn't get boring before students start snoring. For students, less sleep also predicts more conflicts in friendships and romantic relationships (Gordon & Chen, 2014; Tavernier & Willoughby, 2014). Tiredness triggers testiness. (To assess whether you are one of the many sleep-deprived students, see **Table 24.1**.)

TABLE 24.1

Cornell University psychologist James Maas reported that most students suffer the consequences of sleeping less than they should. To see if you are in that group, answer the following true-false questions:

True	**False**	
....	....	1. I need an alarm in order to wake up at the appropriate time.
....	....	2. It’s a struggle for me to get out of bed in the morning.
....	....	3. Weekday mornings I hit snooze several times to get more sleep.
....	....	4. I feel tired, irritable, and stressed out during the week.
....	....	5. I have trouble concentrating and remembering.
....	....	6. I feel slow with critical thinking, problem solving, and being creative.
....	....	7. I often fall asleep watching TV.
....	....	8. I often fall asleep in boring meetings or lectures or in warm rooms.
....	....	9. I often fall asleep after heavy meals.
....	....	10. I often fall asleep while relaxing after dinner.
....	....	11. I often fall asleep within five minutes of getting into bed.
....	....	12. I often feel drowsy while driving.
....	....	13. I often sleep extra hours on weekend mornings.
....	....	14. I often need a nap to get through the day.
....	....	15. I have dark circles around my eyes.

If you answered “true” to three or more items, you probably are not getting enough sleep. To determine your sleep needs, Maas recommends that you “go to bed 15 minutes earlier than usual every night for the next week — and continue this practice by adding 15 more minutes each week — until you wake without an alarm and feel alert all day.” [Sleep Quiz reprinted with permission from James B. Maas, “Sleep to Win!” (Bloomington, IN: AuthorHouse, 2013).]

FYI

In a 2013 Gallup poll, 40 percent of Americans reported getting 6 hours or less sleep a night (Jones, 2013).

Sleep loss is also a predictor of depression (Baglioni et al., 2016).

Researchers who studied 15,500 12- to 18-year-olds found that those who slept 5 or fewer hours a night had a 71 percent higher risk of depression than their peers who slept 8 hours or more (Gangwisch et al., 2010). This link does not appear to reflect an effect of depression on sleep. When children and youth are followed through time, sleep loss predicts depression rather than vice versa (Gregory et al., 2009). Moreover, REM sleep's processing of emotional experiences helps protect against depression (Walker & van der Helm, 2009). After a good night's sleep, we often do feel better the next day. And that may help to explain why parentally enforced bedtimes predict less depression, and why pushing back school start times leads to improved adolescent sleep, alertness, and mood (Perkinson-Gloor et al., 2013; Winsler et al., 2015). Thus, European high schools rarely start before 9 A.M. (Fischetti, 2014). And the American Academy of Pediatrics (2014) advocates similarly delaying adolescents' school start times to "allow students the opportunity to achieve optimal levels of sleep (8.5–9.5 hours)."

> *Smartphones as sleep stealers:* "*You wake up in the middle of the night and grab your smartphone to check the time — it's 3 A.M. — and see an alert. Before you know it, you fall down a rabbit hole of email and Twitter. Sleep? Forget it.*"
>
> *Nick Bilton, "Disruptions: For a Restful Night, Make Your Smartphone Sleep on the Couch," 2014*

AP® EXAM TIP

Make sure you get a good night's sleep before the AP® exam!

Sleep-deprived students often function below their peak. And they know it: Four in five teens and three in five 18- to 29-year-olds wish they could get more sleep on weekdays (Mason, 2003, 2005). "Sleep deprivation has consequences — difficulty studying, diminished productivity, tendency to make mistakes, irritability, fatigue," noted Dement (1999, p. 231). A large sleep debt "makes you stupid." Yet that teen who staggers glumly out of bed in response to an unwelcome alarm, yawns through morning classes, and feels half-depressed much of the day may be energized at 11:00 P.M. and unmindful of the next day's looming sleepiness (Carskadon, 2002).

Lack of sleep can also make you gain weight. Sleep deprivation

- increases *ghrelin*, a hunger-arousing hormone, and decreases its hunger-suppressing partner, *leptin* (Shilsky et al., 2012) (More on these in Module 38.)
- decreases metabolic (energy use) rate (Buxton et al., 2012).
- increases production of *cortisol*, a stress hormone that stimulates the body to make fat.
- enhances limbic brain responses to the mere sight of food and decreases cortical responses that help us resist temptation (Benedict et al., 2012; Greer et al., 2013; St-Onge et al., 2012).

Thus, children and adults who sleep less are heavier than average, and in recent decades people have been sleeping less and weighing more (Shiromani et al., 2012; Suglia et al., 2014). Moreover, experimental sleep deprivation increases appetite and eating; our tired brain finds fatty foods more enticing (Fang et al., 2015; Hanlon et al., 2015). So, sleep loss helps explain the weight gain common among sleep-deprived students (Hull et al., 2007).

Sleep also affects our physical health. When infections do set in, we typically sleep more, boosting our immune cells. Sleep deprivation can suppress immune cells that battle viral infections and cancer (Möller-Levet et al., 2013; Motivala & Irwin, 2007; Opp & Krueger, 2015). One experiment exposed volunteers to a cold virus. Those who averaged less than 5 hours' sleep a night were 4.5 times more likely to develop a cold than those who slept more than 7 hours a night (Prather et al., 2015). Sleep's protective effect may help explain why people who sleep 7 to 8 hours a night tend to outlive those who are chronically sleep deprived, and why older adults who have no difficulty falling or staying asleep tend to live longer than their sleep-deprived agemates (Dew et al., 2003; Parthasarathy et al., 2015; Scullin & Bliwise, 2015).

Sleep deprivation slows reactions and increases errors on visual attention tasks similar to those involved in screening airport baggage, performing surgery, and reading X-rays (Caldwell, 2012; Lim & Dinges, 2010). Slow responses can also spell disaster for those operating equipment, piloting, or driving. Drowsy driving has contributed to an estimated one in six American traffic accidents (AAA, 2010) and to some 30 percent of Australian highway deaths (Maas, 1999). One two-year study examined the driving accidents of more than 20,000 Virginia 16- to 18-year-olds in two major cities. In one city, the high schools started 75 to 80 minutes later than in the other. The late starters had about 25 percent fewer crashes (Vorona et al., 2011). When sleepy frontal lobes confront an unexpected situation, misfortune often results.

> “*So shut your eyes   Kiss me goodbye   And sleep   Just sleep.*”
>
> *My Chemical Romance, “Sleep”*

Stanley Coren capitalized on what is, for many North Americans, a semi-annual sleep-manipulation experiment — the “spring forward” to daylight saving time and “fall back” to standard time. Searching millions of Canadian and U.S. records, Coren found that accidents increased immediately after the spring-forward time change, which shortens sleep (**Figure 24.1**).

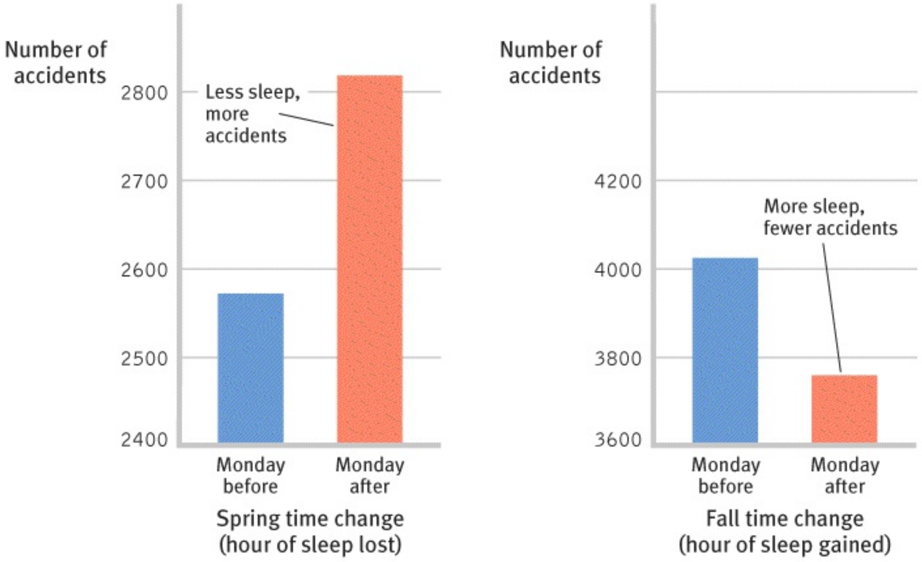


Figure 24.1
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Data from Coren, 1996.

Figure 24.1 Less sleep = more accidents

On the Monday after the spring time change, when people lose one hour of sleep, accidents increased, as compared with the Monday before. In the fall, traffic accidents normally increase because of greater snow, ice, and darkness, but they diminished after the time change.

The same spring-forward effect appeared in another study, which showed that tired people are more likely to "cyberloaf" — to fritter away time online. On the Monday after daylight saving time begins, entertainment-related Google searches have been 3.1 percent higher than on the preceding Monday, and 6.4 percent higher than on the following Monday (Wagner et al., 2012). On that "sleepy Monday," U.S. judges also punish offenders with sentences that are 5 percent longer than average (Cho et al., 2017).

Figure 24.2 summarizes the effects of sleep deprivation. But there is good news! Psychologists have discovered a treatment that strengthens memory, increases concentration, boosts mood, moderates hunger, reduces obesity, fortifies the immune system, and lessens the risk of fatal accidents. Even better news: The treatment feels good, it can be self-administered, the supplies are limitless, and it's free! If you are a typical high school student, often going to bed near midnight and dragged out of bed six or seven hours later by the dreaded alarm, the treatment is simple. Each night, just add 15 minutes to your sleep until you feel more like a rested and energized student and less like a zombie. Ignore that last text, resist the urge to check in with friends online, and succumb to sleep, the gentle tyrant. For some additional tips on getting better quality sleep, see Table 24.2.

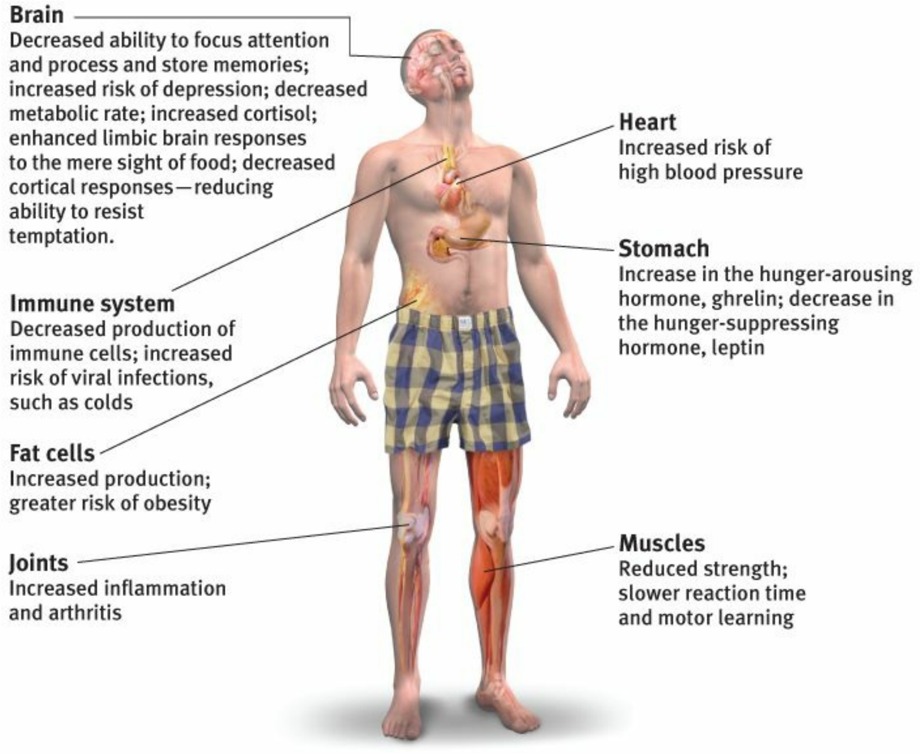
Brain
Decreased ability to focus attention and process and store memories; increased risk of depression; decreased metabolic rate; increased cortisol; enhanced limbic brain responses to the mere sight of food; decreased cortical responses—reducing ability to resist temptation.
Immune system
Decreased production of immune cells; increased risk of viral infections, such as colds
Fat cells
Increased production; greater risk of obesity
Joints
Increased inflammation and arthritis
Heart
Increased risk of high blood pressure
Stomach
Increase in the hunger-arousing hormone, ghrelin; decrease in the hunger-suppressing hormone, leptin
Muscles
Reduced strength; slower reaction time and motor learning

Figure 24.2
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Figure 24.2 How sleep deprivation affects us

TABLE 24.2 Some Natural Sleep Aids

- Exercise regularly but not in the late evening. (Late afternoon is best.)
- Avoid caffeine after early afternoon, and avoid food and drink near bedtime. The exception would be a glass of milk, which provides raw materials for the manufacture of serotonin, a neurotransmitter that facilitates sleep.
- Relax before bedtime, using dimmer light and avoiding screen time.
- Sleep on a regular schedule (rise at the same time even after a restless night) and avoid long naps.
- Hide time displays so you aren't tempted to check repeatedly.
- Reassure yourself that temporary sleep loss causes no great harm.
- Focus your mind on nonarousing, engaging thoughts, such as song lyrics or vacation

travel.
- Manage stress. Realize that for any stressed organism, being vigilant is natural and adaptive. A personal conflict during the day often means a fitful sleep that night. Less stress = better sleep. (See Modules 43 and 44 for more on stress.)

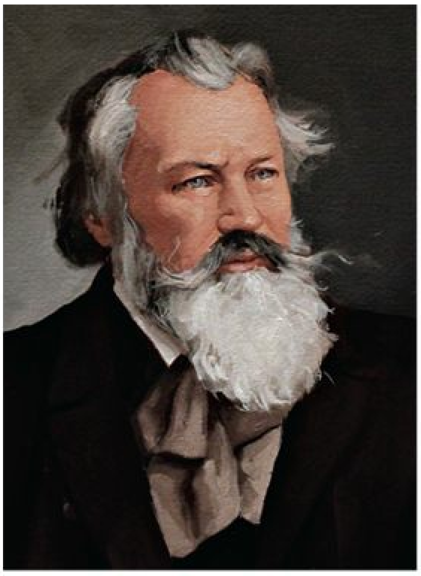
Major Sleep Disorders

Do you have trouble sleeping when anxious or excited? Most of us do. An occasional loss of sleep is nothing to worry about. But about 1 in 10 adults, and 1 in 4 older adults, complain of **insomnia** — persistent problems in either falling or staying asleep (Irwin et al., 2006). The result is tiredness and increased risk of depression (Baglioni et al., 2016). From middle age on, awakening occasionally during the night becomes the norm, not something to fret over or treat with medication (Vitiello, 2009). Ironically, insomnia becomes worse when we fret about it. In laboratory studies, people with insomnia do sleep less than others. But they typically overestimate how long it takes them to fall asleep and underestimate how long they actually have slept (Harvey & Tang, 2012). Even if we have been awake only an hour or two, we may *think* we have had very little sleep because it's the waking part we remember.

insomnia

recurring problems in falling or staying asleep.

The most common quick fixes for true insomnia — sleeping pills and a alcohol — can aggravate the problem, reducing REM sleep and leaving the person with next-day blahs. Such aids can also lead to *tolerance* — a state in which increasing doses are needed to produce an effect.



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Did Brahms need his own lullabies? Cranky, overweight, and nap-prone, classical composer Johannes Brahms exhibited common symptoms of sleep apnea (Margolis, 2000).

Falling asleep is not the problem for people with **narcolepsy** (from the Greek *narke*, "numbness," and *lepsis*, "seizure"), who have sudden attacks of overwhelming sleepiness, usually lasting less than 5 minutes. Although treatable with medication and a sleep regimen, narcolepsy attacks can occur at the most inopportune times, often triggered by strong emotions — perhaps just after taking a terrific swing at a softball or when laughing loudly, shouting angrily, or having sex (Dement, 1978, 1999). In severe cases, the person collapses directly into a brief period of REM sleep, with loss of muscular tension. People with narcolepsy — 1 in 2000 of us, estimated the Stanford University Center for Narcolepsy (2002) — must therefore live with extra caution. As a traffic menace, "snoozing is second only to boozing," says the American Sleep Disorders Association, and those with narcolepsy are especially at risk (Aldrich, 1989).

narcolepsy

a sleep disorder characterized by uncontrollable sleep attacks. The sufferer may lapse directly into REM sleep, often at inopportune times.

Although 1 in 20 of us have **sleep apnea**, it was unknown before modern sleep research. *Apnea* means “with no breath,” and people with this condition intermittently stop breathing during sleep. After an airless minute or so, decreased blood oxygen arouses them enough to snort in air for a few seconds, in a process that repeats hundreds of times each night, depriving them of slow-wave sleep. Apnea sufferers don’t recall these episodes the next day. So, despite feeling fatigued and depressed — and hearing their mate’s complaints about their loud “snoring” — many are unaware of their disorder (Peppard et al., 2006). Sleep apnea is associated with obesity, and as the number of obese Americans has increased, so has sleep apnea, particularly among overweight men (Keller, 2007). Apnea-related sleep loss also contributes to obesity. In addition to loud snoring, other warning signs are daytime sleepiness, irritability, and (possibly) high blood pressure, which increases the risk of a stroke or heart attack (Dement, 1999). If one doesn’t mind looking a little goofy in the dark, the treatment — a masklike device with an air pump that keeps the sleeper’s airway open (imagine a snorkeler at a slumber party) — can effectively relieve apnea symptoms. By so doing, it can also alleviate the depression symptoms that often accompany sleep apnea (Levine, 2012; Wheaton et al., 2012).

sleep apnea

a sleep disorder characterized by temporary cessations of breathing during sleep and repeated momentary awakenings.

Brian Chase/Shutterstock

Now I lay me down to sleep For many with sleep apnea, a continuous positive airway pressure (CPAP) machine applies mild air pressure to keep the airways open, making for sounder sleeping and better quality of life.

Unlike sleep apnea, **night terrors** target mostly children, who may sit up or walk around, talk incoherently, experience doubled heart and breathing rates, and appear terrified while asleep (Hartmann, 1981). They seldom wake up fully during an episode and recall little or nothing the next morning — at most, a fleeting, frightening image. Unlike nightmares — which, like other dreams, typically occur during early morning REM sleep — night terrors usually occur during the first few hours of NREM-3.

night terrors

a sleep disorder characterized by high arousal and an appearance of being terrified; unlike nightmares, night terrors occur during NREM-3 sleep, within two or three hours of falling asleep, and are seldom remembered.

Sleepwalking and *sleeptalking* are usually childhood disorders and, like narcolepsy, they run in families. Occasional childhood sleepwalking (also called *somnambulism*) occurs for about one-third of those with a sleepwalking fraternal twin and half of those with a sleepwalking identical twin. The same is true for sleeptalking (Hublin et al., 1997, 1998). Sleepwalking happens during NREM-3 sleep. Sleeptalking — usually garbled or nonsensical — can occur during any sleep stage (Mahowald & Ettinger, 1990). Sleepwalking is usually harmless. After returning to bed on their own or with the help of a family member, few sleepwalkers recall their trip the next morning. About 20 percent of 3- to 12-year-olds have at least one episode of sleepwalking, usually lasting 2 to 10 minutes; some 5 percent have repeated episodes (Giles et al., 1994). Young children, who have the deepest and lengthiest NREM-3 sleep, are the most likely to experience both night terrors and sleepwalking. As we grow older and deep NREM-3 sleep diminishes, so do night terrors and sleepwalking. (See **Table 24.3** for a summary of these sleep disorders.)

AP® EXAM TIP

The AP® exam could have you identify and differentiate the sleep disorders. For example, you might be asked to explain the difference between a night terror and a nightmare.

TABLE 24.3 Sleep Disorders

Disorder	**Rate**	**Description**	**Effects**
Insomnia	1 in 10 adults; 1 in 4 older adults	Ongoing difficulty falling or staying asleep.	Chronic tiredness. Reliance on sleeping pills and alcohol, which reduce REM sleep and lead to tolerance — a state in which increasing doses are needed to produce an effect.
Narcolepsy	1 in 2000 adults	Sudden attacks of overwhelming sleepiness.	Risk of falling asleep at a dangerous moment. Narcolepsy attacks usually last less than 5 minutes, but they can happen at the worst and most emotional times. Everyday activities, such as driving, require extra caution.

Sleep apnea	1 in 20 adults	Stopping breathing repeatedly while sleeping.	Fatigue and depression (as a result of slow-wave sleep deprivation). Associated with obesity (especially among men).
Sleepwalking and sleeptalking[1]	1–15 in 100 in the general population for sleepwalking; about half of young children for sleeptalking	Doing normal waking activities (sitting up, walking, speaking) while asleep. Sleeptalking can occur during any sleep stage. Sleepwalking happens in NREM-3 sleep.	Few serious concerns. Sleepwalkers return to their beds on their own or with the help of a family member, rarely remembering their trip the next morning.
Night terrors	1 in 100 adults; 1 in 30 children	Appearing terrified, talking nonsense, sitting up, or walking around during NREM-3 sleep; different from nightmares.	Doubling of a child’s heart and breathing rates during the attack. Luckily, children remember little or nothing of the fearful event the next day. As people age, night terrors become more and more rare.

[1] NSF, 2016; Reimão & Lefévre, 1980.

✓ Check Your Understanding

Ask Yourself

- What did you know about sleep deprivation and sleep disorders before taking this course? Have you experienced any of the sleep loss effects or sleep disorders described?

Test Yourself

- A well-rested person would be more likely to have _______________ (trouble concentrating/quick reaction times) and a sleep-deprived person would be more likely to _______________ (gain weight/fight off a cold).

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Dreams

24-2 What do we dream, and what functions have theorists proposed for dreams?

Soon playing at your inner theater: the premiere of a vivid dream. This never-before-seen mental movie features captivating characters wrapped in a plot so original and unlikely, yet so intricate and so seemingly real, that you'll later marvel at its creation.

> “*I do not believe that I am now dreaming, but I cannot prove that I am not.*”
>
> *Philosopher Bertrand Russell (1872–1970)*

Daydreams tend to involve the familiar details of our life — perhaps picturing ourselves explaining to a teacher why an assignment will be late, or replaying in our minds personal encounters we relish or regret. Unlike daydreams, REM **dreams** are vivid, emotional, and often bizarre (Loftus & Ketcham, 1994). Waking from one, we may wonder how our brain can so creatively, colorfully, and completely construct this alternative world. In the shadowland between our dreaming and waking consciousness, we may even wonder for a moment which is real. Awakening from a nightmare, a 4-year-old may be sure there is a bear in the house.

dream

a sequence of images, emotions, and thoughts passing through a sleeping person's mind.

Photofest/Warner Bros. Pictures

A dreamy take on dreamland The 2010 movie *Inception* creatively played off our interest in finding meaning in our dreams, and in understanding the layers of our consciousness. It further explored the idea of creating false memories through the power of suggestion — an idea we will discuss in Module 33**.**

Discovering the link between REM sleep and dreaming began a new era in dream research. Instead of relying on someone's hazy recall hours after having a dream, researchers could catch dreams as they happened. They could awaken people during or within 3 minutes after a REM sleep period and hear a vivid account.

What We Dream

We spend six years of our life in dreams, many of which are anything but sweet. For both women and men, 8 in 10 dreams are marked by at least one negative event or emotion (Domhoff, 2007). Common themes include repeatedly failing in an attempt to do something; being attacked, pursued, or rejected; or experiencing misfortune (Hall et al., 1982). Dreams with sexual imagery occur less often than you might think. In one study, only 1 in 10 dreams among young men and 1 in 30 among young women had sexual content (Domhoff, 1996).

More commonly, a dream's story line incorporates traces of previous days' experiences and preoccupations (De Koninck, 2000):

- *Trauma and dreams.* After suffering a trauma, people commonly report nightmares, which help extinguish daytime fears (Levin & Nielsen, 2007, 2009). One sample of Americans recording their dreams during September 2001 reported an increase in threatening dreams following the 9/11 terrorist attacks (Propper et al., 2007). Compared with

Palestinian children living in a peaceful town in Galilee, those living in the conflict-ridden Gaza Strip more often dream of aggression (Punamäki & Joustie, 1998).

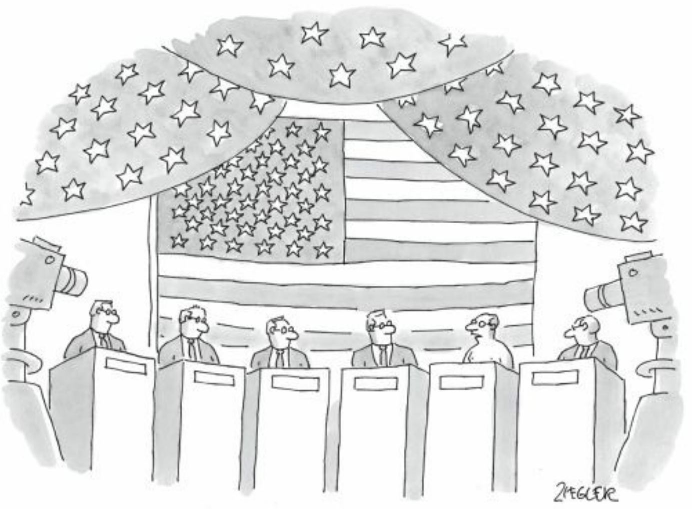
> “*For what one has dwelt on by day, these things are seen in visions of the night.*”
>
> *Menander of Athens (342–292 B.C.E.),* Fragments

- *Musicians’ dreams.* Compared with nonmusicians, musicians report twice as many dreams of music (Uga et al., 2006).
- *Blind people’s dreams.* Studies in four countries have found blind people mostly dreaming of using their nonvisual senses (Buquet, 1988; Taha, 1972; Vekassy, 1977). But even natively blind people sometimes “see” in their dreams (Bértolo, 2005). Likewise, people born paralyzed below the waist sometimes dream of walking, standing, running, or cycling (Saurat et al., 2011; Voss et al., 2011).
- *Media experiences and dreams.* In a study of 1287 Turkish people, “participants who consumed violent media tended to have violent dreams, and participants who consumed sexual media tended to have sexual dreams” (Van den Buick et al., 2016).

FYI

Would you suppose that people dream if blind from birth? Studies in France, Hungary, Egypt, and the United States all found blind people dreaming of using their nonvisual senses — hearing, touching, smelling, tasting (Buquet, 1988; Taha, 1972; Vekassy, 1977).

Our two-track mind continues to monitor our environment while we sleep. Sensory stimuli — a particular odor or a phone’s ringing — may be instantly and ingeniously woven into the dream story. In a classic experiment, researchers lightly sprayed cold water on dreamers’ faces (Dement & Wolpert, 1958). Compared with sleepers who did not get the cold-water treatment, these people were more likely to dream about a waterfall, a leaky roof, or even about being sprayed by someone.



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"Uh-oh. I think I'm having one of those dreams again."

So, could we learn a foreign language by hearing it played while we sleep? If only. While sleeping we can learn to associate a sound with a mild electric shock (and to react to the sound accordingly). We can also learn to associate a particular sound with a pleasant or unpleasant odor (Arzi et al., 2012). But we do not remember recorded information played while we are soundly asleep (Eich, 1990; Wyatt & Bootzin, 1994). In fact, anything that happens during the 5 minutes just before we fall asleep is typically lost from memory (Roth et al., 1988). This explains why sleep apnea patients, who repeatedly awaken with a gasp and then immediately fall back to sleep, do not recall the episodes. Ditto someone who awakens momentarily, sends a text message, and the next day can't remember doing so. It also explains why dreams that momentarily awaken us are mostly forgotten by morning. To remember a dream, get up and stay awake for a few minutes.

> “*Follow your dreams, except for that one where you're naked at work.*”
>
> *Attributed to comedian Henny Youngman*

Why We Dream

▶ Flip It Video: Why Do We Dream?

Dream theorists have proposed several explanations of why we dream, including these:

To satisfy our own wishes. In 1900, in his landmark book *The Interpretation of Dreams*, Sigmund Freud offered what he thought was "the most valuable of all the discoveries it has been my good fortune to make." He proposed that dreams provide a psychic safety valve that discharges otherwise unacceptable feelings. He viewed a dream's **manifest content** (the apparent and remembered story line) as a censored, symbolic version of its **latent content**, the unconscious drives and wishes (often erotic) that would be threatening if expressed directly. Thus, a gun might be a disguised representation of a penis.

manifest content

according to Freud, the symbolic, remembered story line of a dream (as distinct from its latent, or hidden, content).

latent content

according to Freud, the underlying meaning of a dream (as distinct from its manifest content).

FYI

A popular sleep myth: If you dream you are falling and hit the ground (or if you dream of dying), you die. (Unfortunately, those who could confirm these ideas are not around to do so. Some people, however, have had such dreams and are alive to report them.)

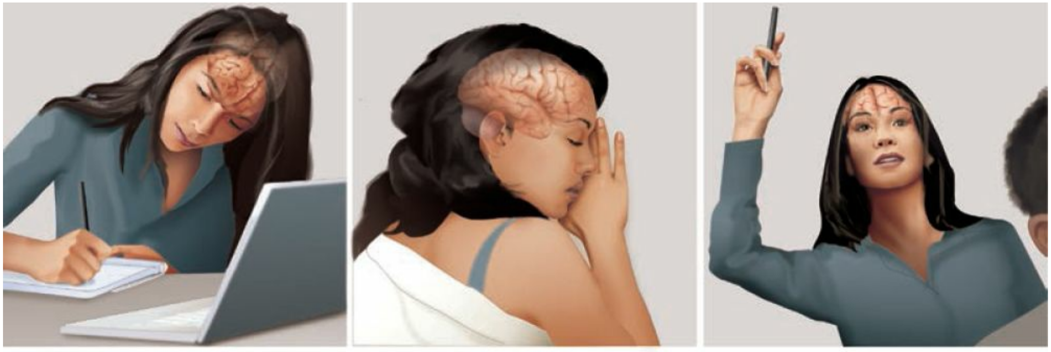
Freud considered dreams the key to understanding our inner conflicts. However, his critics say it is time to wake up from Freud's dream theory, which they regard as a scientific nightmare. "There is no reason to believe any of Freud's specific claims about dreams and their purposes," observed dream researcher William Domhoff (2003). Some contend that even if dreams are symbolic, they could be interpreted any way one wished. Others maintain that dreams hide nothing: A dream about a gun is a dream about a gun. Legend has it that even Freud, who loved to smoke cigars, acknowledged that “sometimes, a cigar is just a cigar.” Freud’s wish-fulfillment theory of dreams has in large part given way to other theories.

To file away memories. The *information-processing* perspective proposes that dreams may help sift, sort, and fix the day’s experiences in our memory. Some studies support this view. When tested the day after learning a task, those who had been deprived of both slow-wave and REM sleep did not do as well as those who had slept undisturbed (Stickgold, 2012). Other studies showed similar memory lapses for new material among people who were awakened every time they began REM sleep (Empson & Clarke, 1970; Karni & Sagi, 1994).

> “*When people interpret [a dream] as if it were meaningful and then sell those interpretations, it’s quackery.*”
>
> *Sleep researcher J. Allan Hobson (1995)*

Brain scans confirm the link between REM sleep and memory. The brain regions that were active as rats learned to navigate a maze, or as people learned to perform a visual-discrimination task, became active again later during REM sleep (Louie & Wilson, 2001; Maquet, 2001). So precise were these activity patterns that scientists could tell where in the maze the rat would be if awake. To sleep, perchance to remember.

This is important news for students, many of whom, observed researcher Robert Stickgold (2000), suffer from a kind of sleep bulimia — sleep deprived on weekdays and binge sleeping on the weekend. “If you don’t get good sleep and enough sleep after you learn new stuff, you won’t integrate it effectively into your memories,” he warned. That helps explain why high school students with high grades slept about 25 minutes longer each night than their lower-achieving classmates (Wolfson & Carskadon, 1998; see **Figure 24.3**). Sacrificing sleep time to study actually *worsens* academic performance by making it harder the next day to understand class material or do well on a test (Gillen-O’Neel et al., 2013).



(a)
Learning

(b)
Sleep consolidates our learning into long-term memory.

(c)
Learning is retained.

Figure 24.3
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Figure 24.3 A sleeping brain is a working brain

FYI

Question: Does eating spicy foods cause one to dream more?

Answer: A spicy food that causes you to awaken more will increase your chance of recalling a dream (Moorcroft, 2003).

To develop and preserve neural pathways. Perhaps dreams, or the brain activity associated with REM sleep, serve a *physiological* function, providing the sleeping brain with periodic stimulation. This theory makes developmental sense. As you will see in Unit IX, stimulating experiences preserve and expand the brain’s neural pathways. Infants, whose neural networks are fast developing, spend much of their abundant sleep time in REM sleep (**Figure 24.4**).

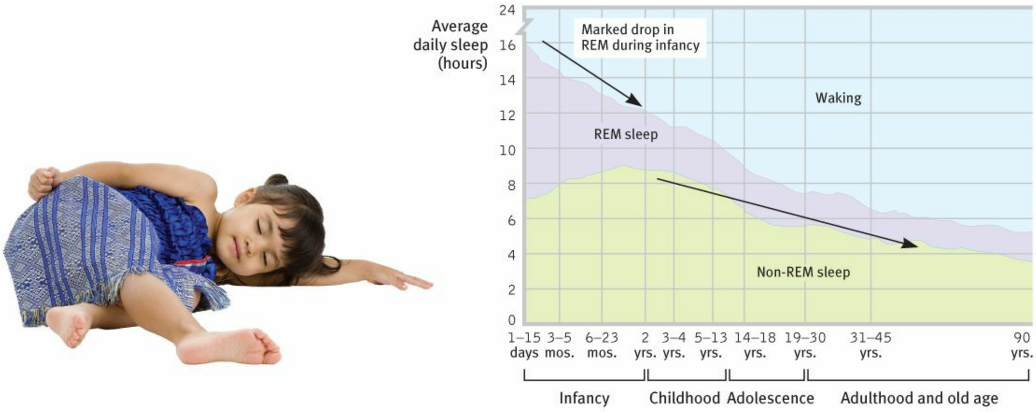

Figure 24.4
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swissmacky/Shutterstock
Data from Snyder & Scott, 1972.

Figure 24.4 Sleep across the life span

As we age, our sleep patterns change. During our first few months, we spend progressively less time in REM sleep. During our first 20 years, we spend progressively less time asleep.

To make sense of neural static. Other theories propose that dreams erupt from neural activation spreading upward from the brainstem (Antrobus, 1991; Hobson, 2003, 2004, 2009). According to *activation-synthesis theory*, dreams are the brain's attempt to synthesize random neural activity. Much as a neurosurgeon can produce hallucinations by stimulating different parts of a patient's cortex, so can stimulation originating within the brain. As Freud might have expected, PET scans of sleeping people also reveal increased activity in the emotion-related limbic system (in the amygdala) during emotional dreams (Schwartz, 2012). In contrast, frontal lobe regions responsible for inhibition and logical thinking seem to idle, which may explain why our dreams are less inhibited than we are when awake (Maquet et al., 1996). Add the limbic system's emotional tone to the brain's visual bursts and — Voilà! — we dream. Damage either the limbic system or the visual centers active during dreaming, and dreaming itself may be impaired (Domhoff, 2003).

***To reflect cognitive development*.** Some dream researchers prefer to see dreams as part of brain maturation and cognitive development (Domhoff, 2010, 2011; Foulkes, 1999). For example, prior to age 9, children's dreams seem more like a slide show and less like an active story in which the dreamer is an actor. Dreams overlap with waking cognition and feature coherent speech. They *simulate reality* by drawing on our concepts and knowledge. They engage brain networks that also are active during daydreaming — and so may be viewed as intensified mind wandering, enhanced by visual imagery (Fox et al., 2013). Unlike the idea that dreams arise from bottom-up brain activation, the cognitive perspective emphasizes our mind's top-down control of our dream content (Nir & Tononi, 2010). Dreams, says G. William Domhoff (2014), "dramatize our wishes, fears, concerns, and interests in striking scenarios that we experience as real events."

Table 24.4 compares these major dream theories. Although today's sleep researchers debate dreams' function — and some are skeptical that dreams serve any function — there is one thing they agree on: We need REM sleep. Deprived of it by repeated awakenings, people return more and more quickly to the REM stage after falling back to sleep. When finally allowed to sleep undisturbed, they literally sleep like babies — with increased REM sleep, a phenomenon called **REM rebound**. Most other mammals also experience REM rebound, suggesting that the causes and functions of REM sleep are deeply biological. (That REM sleep occurs in mammals — and not in animals such as fish, whose behavior is less influenced by learning — fits the information-processing theory of dreams.)

TABLE 24.4 Dream Theories

Theory	Explanation	Critical Considerations
Freud's wish-fulfillment	Dreams preserve sleep and provide a "psychic safety valve" — expressing otherwise unacceptable feelings; contain manifest (remembered) content and a deeper layer of latent content (a hidden meaning).	Lacks any scientific support; dreams may be interpreted in many different ways.
Information-processing	Dreams help us sort out the day's events and consolidate our memories.	But why do we sometimes dream

		about things we have not experienced and about past events?
Physiological function	Regular brain stimulation from REM sleep may help develop and preserve neural pathways.	This does not explain why we experience *meaningful* dreams.
Activation-synthesis	REM sleep triggers neural activity that evokes random visual memories, which our sleeping brain weaves into stories.	But it’s *our* brain weaving the stories, so this still tells us something about ourselves.
Cognitive development	Dream content reflects dreamers’ level of cognitive development — their knowledge and understanding. Dreams simulate our lives, including worst-case scenarios.	Does not propose an adaptive function of dreams.

REM rebound

the tendency for REM sleep to increase following REM sleep deprivation.

So does this mean that because dreams serve physiological functions and extend normal cognition, they are psychologically meaningless? Not necessarily. Every psychologically meaningful experience involves an active brain. We are once again reminded of a basic principle: *Biological and psychological explanations of behavior are partners, not competitors.*

Dreams are a fascinating altered state of consciousness. But they are not the only altered states. As we will see next, psychoactive drugs also alter conscious awareness.

✓ Check Your Understanding

Ask Yourself

- In some countries, the school day for teenagers runs from 9:00 A.M. to 4:00 P.M. But in the United States, the teen school day often runs from 8:00 A.M. to 3:00 P.M., or even 7:00 A.M. to 2:00 P.M. Early to rise isn't making kids wise, say critics — it's making them sleepy. For optimal alertness and well-being, teens need 8 to 9 hours of sleep a night. So, should early-start schools move to a later start time, even if it requires switching start times with elementary schools? What do you think?

Test Yourself

- Are you getting enough sleep? What might you ask yourself to answer this question?
- What five theories propose explanations for why we dream?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 24 REVIEW

24-1 How does sleep loss affect us, and what are the major sleep disorders?

- Sleep deprivation causes fatigue and irritability, and it impairs concentration, productivity, and memory consolidation. It can also lead to depression, obesity, joint pain, a suppressed immune system, and slowed performance (with greater vulnerability to accidents).
- Sleep disorders include *insomnia* (recurring wakefulness), *narcolepsy* (sudden uncontrollable sleepiness or lapsing into REM sleep), *sleep apnea* (the stopping of breathing while asleep, associated with obesity, especially in men), *night terrors* (high arousal and the appearance of being terrified; NREM-3 disorder found mainly in children), sleepwalking (NREM-3 disorder also found mainly in children), and sleeptalking.

24-2 What do we dream, and what functions have theorists proposed for dreams?

- We usually *dream* of ordinary events and everyday experiences, most involving some anxiety or misfortune.
- Fewer than 10 percent of dreams among men, and fewer still among women, have any sexual content.
- Most dreams occur during REM sleep; those that happen during NREM sleep tend to be vague, fleeting images.
- There are five major views of the function of dreams:
    - Freud's wish-fulfillment: Dreams provide a psychic "safety valve," with *manifest content* (story line) acting as a censored version of *latent content* (underlying meaning that gratifies our unconscious wishes).

  - Information-processing: Dreams help us sort out the day’s events and consolidate them in memory.
  - Physiological function: Regular brain stimulation may help develop and preserve neural pathways in the brain.
  - Activation-synthesis: The brain attempts to make sense of neural static by weaving it into a story line.
  - Cognitive development: Dreams reflect the dreamer’s cognitive development — their knowledge and understanding.
- Most sleep theorists agree that REM sleep and its associated dreams serve an important function, as shown by the *REM rebound* that occurs following REM deprivation in humans and other species.

Multiple-Choice Questions

1. Sleep deprivation can lead to weight gain, reduced muscle strength, suppression of the cells that fight common colds, and most likely which of the following?

a. Increased productivity
b. Depression
c. Decreased mistakes on homework
d. Increased feeling of well-being
e. Sleep apnea

2. Shortly after falling asleep, and hundreds of times during the night, Paola wakes up after a loud “snore” of breath, because she has stopped breathing. With which sleep disorder would she most likely be diagnosed?

a. Narcolepsy
b. Insomnia
c. Sleep apnea
d. Nightmares
e. Night terrors

3. Which of the following dream theories states that dreams help us sort out the day’s events and consolidate our memories?

a. Information-processing
b. Wish-fulfillment
c. Physiological function
d. Neural activation
e. Neural disconnection

4. After two nights without sleep, which of the following can be expected?

a. An increase in night terrors
b. Sleep apnea
c. Manifest content dreams
d. Narcolepsy
e. REM rebound

5. Sigmund Freud believed that a dream’s _____ content reflected the deep, underlying meaning of the dream.

a. manifest
b. dissociative
c. cognitive
d. latent
e. circadian

Practice FRQs

1. Angelica was just hired for a new job in a day-care center. She has recently been under the care of her physician who is treating her for a sleep disorder. Indicate how her performance will be affected if she suffers from the following disorders:

- Sleep apnea
- Narcolepsy
- Insomnia

Answer

1 point: If Angelica suffers from sleep apnea, she may be tired and irritable at work because she is often waking up during the night to breathe. Pages 245–246

1 point: If Angelica suffers from narcolepsy, she may suddenly fall asleep at work; this would most likely happen during an emotional moment. Page 245

1 point: If Angelica suffers from insomnia, she will be tired during the day at work because she is having difficulty falling asleep or staying asleep at night. Page 244

2. Explain the following two theories regarding why we dream. Include a criticism each faces:

- Freud’s wish-fulfillment theory
- Activation-synthesis theory

(4 points)

Module 25 Psychoactive Drugs

LEARNING TARGETS

- 25-1 Describe *substance use disorders.*
- 25-2 Discuss the roles that tolerance and addiction play in substance use disorders, and how the concept of addiction has changed.
- 25-3 Identify the *depressants*, and describe their effects.
- 25-4 Identify the *stimulants*, and describe their effects.
- 25-5 Identify the *hallucinogens*, and describe their effects.

Tolerance and Addiction in Substance Use Disorders

25-1 What are *substance use disorders*?

Let’s imagine a day in the life of a legal-drug-using adult. It begins with a wake-up latte. By midday, several cigarettes have calmed frazzled nerves before an appointment at the plastic surgeon’s office for wrinkle-smoothing Botox injections. An afternoon double espresso provides a needed boost. A diet pill before dinner helps curb the appetite. Later, a beer and two Advil PMs help offset those stimulating effects. And if performance needs enhancing, there are beta blockers for onstage performers, Viagra for middle-aged and older men, and Adderall for college students hoping to focus their concentration. Before drifting off into REM-depressed sleep, our hypothetical drug user is dismayed by news reports of pill-sharing, pill-popping teenagers.

Such substances are **psychoactive drugs**, chemicals that change perceptions and moods. Most of us manage to use some psychoactive drugs in moderation and without disrupting our lives. But sometimes, drug use crosses the line between moderation and **substance use disorder** (**Table 25.1**). (See Thinking Critically About: Tolerance and Addiction.)

> “*Substance use disorders don’t discriminate; they affect the rich and the poor; they affect all ethnic groups. This is a public health crisis, but we do have solutions.*”
>
> *U.S. Surgeon General Vivek Murthy, November 2016*

psychoactive drug

a chemical substance that alters perceptions and moods.

substance use disorder

a disorder characterized by continued substance craving and use despite significant life disruption and/or physical risk.

TABLE 25.1 When Is Drug Use a Disorder?

According to the American Psychiatric Association, a person may be diagnosed with *substance use disorder* when drug use continues despite significant life disruption. Resulting brain changes may persist after quitting use of the substance (thus leading to strong cravings when exposed to people and situations that trigger memories of drug use). The severity of substance use disorder varies from *mild* (two to three of the indicators listed below) to *moderate* (four to five indicators) to *severe* (six or more indicators). (*Source:* American Psychiatric Association, 2013.)

Diminished Control

1. Uses more substance, or for longer, than intended.
2. Tries unsuccessfully to regulate use of substance.
3. Spends much time acquiring, using, or recovering from effects of substance.
4. Craves the substance.

Diminished Social Functioning

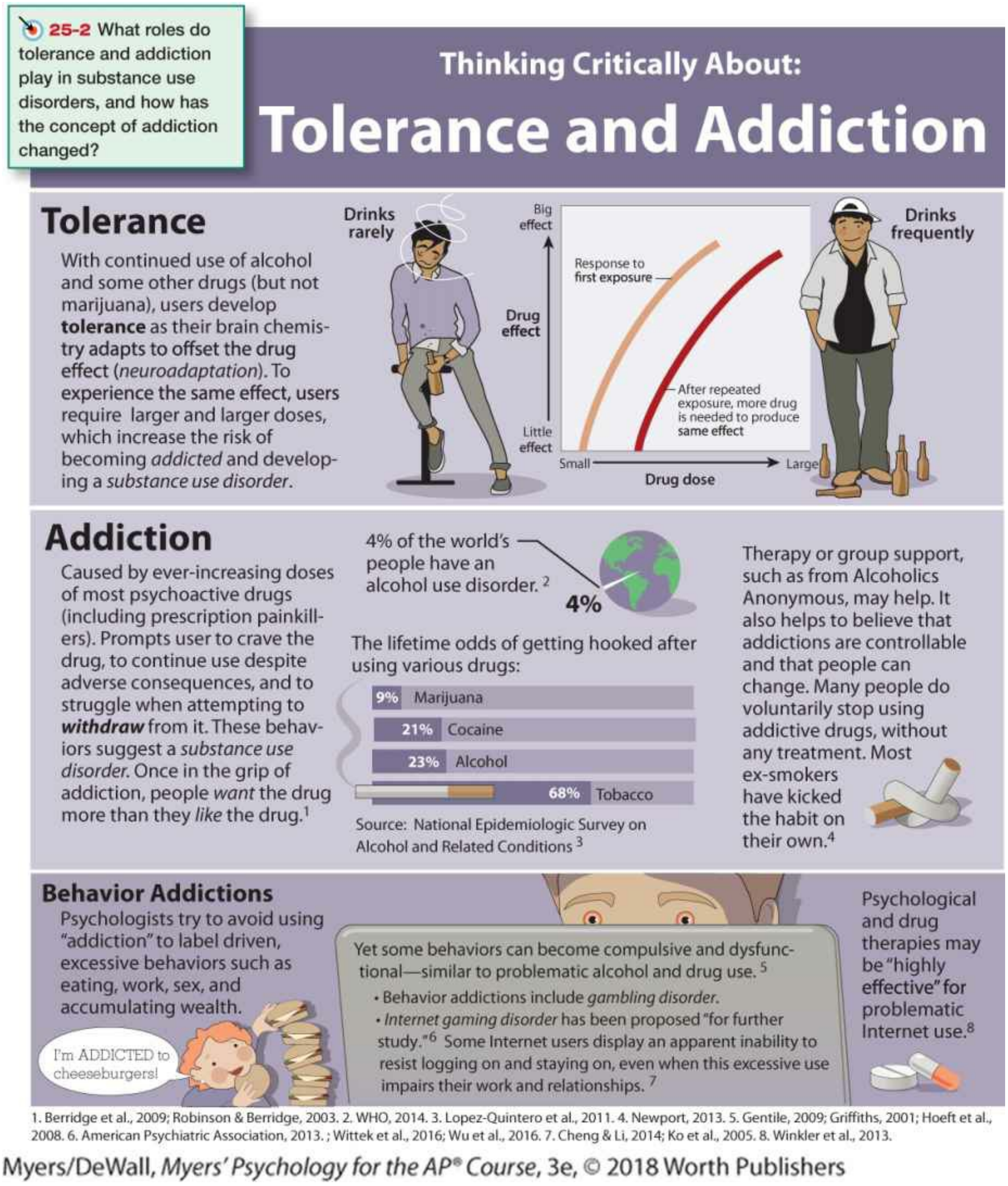
5. Use disrupts commitments at work, school, or home.
6. Continues use despite social problems.
7. Causes reduced social, recreational, and work activities.

Hazardous Use

8. Continues use despite hazards.
9. Continues use despite worsening physical or psychological problems.

Drug Action

10. Experiences tolerance (needing more substance for the desired effect).
11. Experiences withdrawal when attempting to end use.



25-2 What roles do tolerance and addiction play in substance use disorders, and how has the concept of addiction changed?

Thinking Critically About:

Tolerance and Addiction

Tolerance

With continued use of alcohol and some other drugs (but not marijuana), users develop **tolerance** as their brain chemistry adapts to offset the drug effect (*neuroadaptation*). To experience the same effect, users require larger and larger doses, which increase the risk of becoming *addicted* and developing a *substance use disorder*.

Drinks rarely
Big effect
Drug effect
Little effect
Response to first exposure
After repeated exposure, more drug is needed to produce same effect
Small
Drug dose
Large
Drinks frequently

Addiction

Caused by ever-increasing doses of most psychoactive drugs (including prescription painkillers). Prompts user to crave the drug, to continue use despite adverse consequences, and to struggle when attempting to ***withdraw*** from it. These behaviors suggest a *substance use disorder*. Once in the grip of addiction, people *want* the drug more than they *like* the drug.[1]

4% of the world's people have an alcohol use disorder.[2]

The lifetime odds of getting hooked after using various drugs:

9%	Marijuana
21%	Cocaine
23%	Alcohol
68%	Tobacco

Source: National Epidemiologic Survey on Alcohol and Related Conditions[3]

Therapy or group support, such as from Alcoholics Anonymous, may help. It also helps to believe that addictions are controllable and that people can change. Many people do voluntarily stop using addictive drugs, without any treatment. Most ex-smokers have kicked the habit on their own.[4]

Behavior Addictions

Psychologists try to avoid using "addiction" to label driven, excessive behaviors such as eating, work, sex, and accumulating wealth.

Yet some behaviors can become compulsive and dysfunctional—similar to problematic alcohol and drug use.[5]

- Behavior addictions include *gambling disorder*.
- *Internet gaming disorder* has been proposed "for further study."[6] Some Internet users display an apparent inability to resist logging on and staying on, even when this excessive use impairs their work and relationships.[7]

Psychological and drug therapies may be "highly effective" for problematic Internet use.[8]

1. Berridge et al., 2009; Robinson & Berridge, 2003. 2. WHO, 2014. 3. Lopez-Quintero et al., 2011. 4. Newport, 2013. 5. Gentile, 2009; Griffiths, 2001; Hoeft et al., 2008. 6. American Psychiatric Association, 2013. ; Wittek et al., 2016; Wu et al., 2016. 7. Cheng & Li, 2014; Ko et al., 2005. 8. Winkler et al., 2013.

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Flip It Video: The Psychology of Addiction

tolerance

the diminishing effect with regular use of the same dose of a drug, requiring the user to take larger and larger doses before experiencing the drug's effect.

withdrawal

the discomfort and distress that follow discontinuing an addictive drug or behavior.

A drug's overall effect depends not only on its biological effects but also on the user's expectations, which vary with social and cultural contexts (Gu et al., 2015; Ward, 1994). If one culture assumes that a particular drug produces euphoria (or aggression or sexual arousal) and another does not, each culture may find its expectations fulfilled. In Module 81 we'll take a closer look at these interacting forces in the use and potential abuse of particular psychoactive drugs. But here let's consider what contributes to the disordered use of various substances.

✓ Check Your Understanding

Ask Yourself

- Do you have relatives who started smoking when they were younger and have since been unable to quit? Do you think they knew then how likely they were to get hooked?

Test Yourself

- What is the process that leads to drug tolerance?
- Can someone become "addicted" to shopping?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Types of Psychoactive Drugs

Flip It Video: Neurotransmitters and Drugs

The three major categories of psychoactive drugs are *depressants*, *stimulants*, and *hallucinogens*. All do their work at the brain’s synapses, stimulating, inhibiting, or mimicking the activity of the brain’s own chemical messengers, the neurotransmitters.

AP® EXAM TIP

These three categories — depressants, stimulants, and hallucinogens — are important. There are likely to be questions on the AP® exam that will require you to know how a particular psychoactive drug is classified and what affect the drug has on the body.

Depressants

25-3 What are *depressants*, and what are their effects?

Depressants are drugs such as alcohol, barbiturates (tranquilizers), and opiates that calm neural activity and slow body functions.

depressants

drugs (such as alcohol, barbiturates, and opiates) that reduce neural activity and slow body functions.

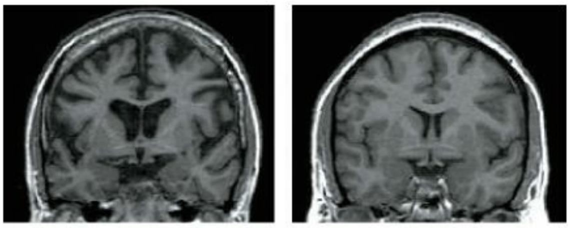
Alcohol

True or false? Alcohol is a depressant in large amounts but is a stimulant in small amounts. *False. In any amount, alcohol is a depressant.* Low doses of alcohol may, indeed, enliven a drinker, but they do so by acting as a *disinhibitor* — they slow brain activity that controls judgment and inhibitions. Alcohol is an equal-opportunity drug: It increases (disinhibits) helpful tendencies — as when tipsy restaurant patrons leave extravagant tips and social drinkers bond in groups (Fairbairn & Sayette, 2014; Lynn, 1988). And it increases harmful tendencies, as when sexually aroused men become more disposed to sexual aggression. One University of Illinois campus survey showed that before sexual assaults, 80 percent of the male assailants and 70 percent of the female victims had been drinking (Camper, 1990). Another survey of 89,874 American collegians found alcohol or drugs involved in 79 percent of unwanted sexual intercourse experiences (Presley et al., 1997). When drinking, both men and women are more disposed to casual sex (Claxton et al., 2015; Johnson & Chen, 2015). *The bottom line:* The urges you would feel if sober are the ones you will more likely act upon when intoxicated.

The prolonged and excessive drinking that characterizes **alcohol use disorder** can shrink the brain (**Figure 25.1**). Women, who have less of a stomach enzyme that digests alcohol, are especially vulnerable (Wuethrich, 2001). Girls and young women can become addicted to alcohol more quickly than boys and young men do, and they are at risk for lung, brain, and liver damage at lower consumption levels (CASA, 2003).

alcohol use disorder

(popularly known as *alcoholism*) alcohol use marked by tolerance, withdrawal, and a drive to continue problematic use.



Scan of woman with alcohol use disorder

Scan of woman without alcohol use disorder

Figure 25.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Daniel Hommer, NIAAA, NIH, HHS

Figure 25.1 Disordered drinking shrinks the brain

MRI scans show brain shrinkage in women with alcohol use disorder (left) compared with women in a control group (right).

MARYSVILLE FD

© Lon C. Diehl/PhotoEdit

Drinking disaster demo Firefighters reenacted the trauma of an alcohol-related car accident, providing a memorable demonstration for these high school students. Alcohol consumption leads to feelings of invincibility, which become especially dangerous behind the wheel of a car.

SLOWED NEURAL PROCESSING Alcohol slows sympathetic nervous system activity. In low doses, it relaxes the drinker. In larger doses, it causes reactions to slow, speech to slur, and skilled performance to deteriorate. Paired with sleep deprivation, alcohol is a potent sedative. Add these physical effects to lowered inhibitions, and the result can be deadly. Worldwide, several hundred thousand lives are lost each year in alcohol-related accidents and violent crime. As blood-alcohol levels rise and judgment falters, people’s qualms about drinking and driving lessen. When drunk, people aren’t aware how drunk they are (Moore et al., 2016). In experiments, virtually all drinkers who had insisted when sober that they would not drive under the influence later decided to drive home from a bar, even if given a Breathalyzer test and told they were intoxicated (Denton & Krebs, 1990; MacDonald et al., 1995). Alcohol can be life threatening when heavy drinking follows an earlier period of moderate drinking, which depresses the vomiting response. People may poison themselves with an overdose that their bodies would normally throw up.

MEMORY DISRUPTION Alcohol can disrupt memory formation, and heavy drinking can also have long-term effects on the brain and cognition. In rats, at a developmental period corresponding to human adolescence, binge drinking contributes to nerve cell death and reduces the birth of new nerve cells. It also impairs the growth of synaptic connections (Crews et al., 2006, 2007). In humans, heavy drinking may lead to blackouts, in which drinkers are unable to recall people they met the night before or what they said or did while intoxicated. These blackouts result partly from the way alcohol suppresses REM sleep, which helps fix the day's experiences into permanent memories.

REDUCED SELF-AWARENESS In one experiment, those who consumed alcohol (rather than a placebo beverage) were doubly likely to be caught mind-wandering during a reading task, yet were *less* likely to notice that they zoned out (Sayette et al., 2009). Sometimes we mind-wander to give our brains a break, but unintentional zoning out — while driving, for example — can cause later regret, especially if we've endangered ourselves or others (Seli et al., 2016). Alcohol not only reduces self-awareness, it also produces a sort of "myopia" by focusing attention on an arousing situation (say, provocation) and distracting it from normal inhibitions and future consequences (Giancola et al., 2010; Hull & Bond, 1986; Steele & Josephs, 1990).

Reduced self-awareness may help explain why people who want to suppress their awareness of failures or shortcomings are more likely to drink than are those who feel good about themselves. Losing a business deal, a game, or a romantic partner sometimes elicits a drinking binge.

EXPECTANCY EFFECTS As with other psychoactive drugs, expectations influence behavior. Expectations help explain why adolescents — presuming that alcohol will lift their spirits — sometimes drink when they're upset and alone. Solitary drinking actually does not boost mood, but it does increase the likelihood of developing a substance use disorder (Creswell et al., 2014; Fairbairn & Sayette, 2014).

Simply *believing* we're consuming alcohol can cause us to act out alcohol's presumed influence (Christiansen et al., 2016; Moss & Albery, 2009). In a now-classic experiment, researchers gave Rutgers University men (who had volunteered for a study on "alcohol and sexual stimulation") either an alcoholic or a nonalcoholic drink (Abrams & Wilson, 1983). (Both had strong tastes that masked any alcohol.) After watching an erotic movie clip, the men who *thought* they had consumed alcohol were more likely to report having strong sexual fantasies and feeling guilt-free. Being able to *attribute* their sexual responses to alcohol released their inhibitions — whether or not they had actually consumed any alcohol.

So, alcohol's effect lies partly in that powerful sex organ, the mind. Fourteen "intervention studies" have educated college drinkers about that very point (Scott-Sheldon et al., 2014). Most participants came away with lower positive expectations of alcohol and reduced their drinking the ensuing month.

Barbiturates

Like alcohol, the **barbiturate** drugs, or *tranquilizers*, depress nervous system activity. Barbiturates such as Nembutal, Seconal, and Amytal are sometimes prescribed to induce sleep or reduce anxiety. In larger doses, they can impair memory and judgment. If combined with alcohol — as sometimes happens when people take a sleeping pill after an evening of heavy drinking — the total depressive effect on body functions can be lethal.

barbiturates

drugs that depress central nervous system activity, reducing anxiety but impairing memory and judgment.

Opiates

The **opiates** — opium and its derivatives — also depress neural functioning. Opiates include *heroin* and also medically prescribed pain-relief *narcotics*, such as codeine, morphine, and *methadone* (a synthetic opiate sometimes prescribed as a heroin substitute). As blissful pleasure replaces pain and anxiety, the user's pupils constrict, breathing slows, and lethargy sets in. Those who become addicted to this short-term pleasure may pay a long-term price: a gnawing craving for another fix, a need for progressively larger doses (as tolerance develops), and the extreme discomfort of withdrawal. When repeatedly flooded with an artificial opiate, the brain eventually stops producing *endorphins*, its own opiates. If the artificial opiate is then withdrawn, the brain will lack the normal level of these painkilling neurotransmitters. In recent years, more and more people have been unable or unwilling to tolerate this state and have paid an ultimate price — death by overdose (CDC, 2015).

opiates

opium and its derivatives, such as morphine and heroin; depress neural activity, temporarily lessening pain and anxiety.

✓ Check Your Understanding

Ask Yourself

- Does it surprise you that alcohol's effects can be influenced by our expectations?

Test Yourself

- Alcohol, barbiturates, and opiates are all in a class of drugs called ___________.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Stimulants

25-4 What are *stimulants*, and what are their effects?

A **stimulant** excites neural activity and speeds up body functions. Pupils dilate, heart and breathing rates increase, and blood sugar levels rise, causing a drop in appetite. Energy and self-confidence also rise.

stimulants

drugs (such as caffeine, nicotine, and the more powerful cocaine, amphetamines, methamphetamine, and Ecstasy) that excite neural activity and speed up body functions.

Stimulants include caffeine, nicotine, and the more powerful cocaine, *amphetamines, methamphetamine* ("speed"), and Ecstasy (which is also a mild hallucinogen). People use stimulants to feel alert, lose weight, or boost mood or athletic performance. Some students may resort to stimulants in hopes of boosting their academic performance. Unfortunately, such stimulants offer only modest benefits (Ilieva et al., 2015). Stimulants can also be addictive, as you may know if you are one of the many who use caffeine daily in your soda, energy drinks, coffee, or tea. Cut off from your usual dose, you may crash into fatigue, headaches, irritability, and depression (Silverman et al., 1992). A mild dose of caffeine typically lasts three or four hours, which — if taken in the evening — may impair sleep.

Coffee
Tea
Espresso
Caffè Latte
Macchiato
Cappuccino
Hot chocolate

Vasca/Shutterstock

Nicotine

Cigarettes, e-cigarettes, and other tobacco products deliver highly addictive **nicotine**. Imagine that cigarettes were harmless — except, once in every 25,000 packs, an occasional innocent-looking one is filled with dynamite instead of tobacco. Not such a bad risk of having your head blown off. But with 250 million packs a day consumed worldwide, we could expect more than 10,000 gruesome daily deaths (more than three times the 9/11 terrorist fatalities each and every day) — surely enough to have cigarettes banned everywhere.[1]

nicotine

a stimulating and highly addictive psychoactive drug in tobacco.

The lost lives from these dynamite-loaded cigarettes approximate those from today's actual cigarettes. A teen-to-the-grave smoker has a 50 percent chance of dying from the habit, and each year, tobacco kills nearly 5.4 million of its 1.3 billion customers worldwide. (Imagine the outrage if 25 loaded jumbo jets crashed today, let alone tomorrow and every day thereafter.) By 2030, annual tobacco deaths are expected to increase to 8 million. That means that *1 billion* twenty-first-century people may be killed by tobacco (WHO, 2012).

Tobacco products include cigarettes, cigars, chewing tobacco, pipe tobacco, snuff, and — most recently — e-cigarettes. Inhaling the vapor of e-cigarettes ("vaping") gives users a jolt of nicotine without cancer-causing tar. As a result, their sale has boomed: Between 2011 and 2013, youth e-cigarette use tripled (Arrazola et al., 2015; Noland et al., 2016). But there is a downside: E-cigarettes deliver toxic chemicals and can increase one's chances of using conventional cigarettes (Barrington-Trimis et al., 2016; Farsalinos et al., 2014). And e-cigarettes seem not to help current smokers quit, as companies sometimes claim (Wang et al., 2015).

FYI

For HIV patients who smoke, the virus is now much less lethal than the smoking (Helleberg et al., 2013).

Smoke a cigarette and nature will charge you 12 minutes — ironically, just about the length of time you spend smoking it (Discover, 1996). (Researchers don't yet know how e-cigarette smoking affects life expectancy.) Compared with nonsmokers, smokers' life expectancy is "at least 10 years shorter" (CDC, 2013). Eliminating smoking would increase life expectancy more than any other preventive measure. Why, then, do so many people smoke?

> “ *Smoking cures weight problems . . . eventually.* ”
>
> *Comedian-writer Steven Wright*

Tobacco products are powerfully and quickly addictive. Attempts to quit even within the first weeks of smoking often fail (DiFranza, 2008). As with other addictions, smokers develop *tolerance*, and quitting causes withdrawal symptoms, including craving, insomnia, anxiety, irritability, and distractibility. Nicotine-deprived smokers trying to focus on a task experience a tripled rate of mind wandering (Sayette et al., 2010). When not craving a cigarette, they tend to underestimate the power of such cravings (Sayette et al., 2008).

All it takes to relieve the aversive state of a cigarette craving is a single puff. Within 7 seconds, a rush of nicotine will signal the central nervous system to release a flood of neurotransmitters (**Figure 25.2**). Epinephrine and norepinephrine will diminish appetite and boost alertness and mental efficiency. Dopamine and opioids will temporarily calm anxiety and reduce sensitivity to pain (Ditre et al., 2011; Gavin, 2004). No wonder ex-smokers will sometimes, under stress, return to smoking — as did some 1 million Americans after the 9/11 terrorist attacks (Pesko, 2014). Ditto for people with major depressive disorder, who are more likely than others to see their efforts to quit go up in smoke (Zvolensky et al., 2015).

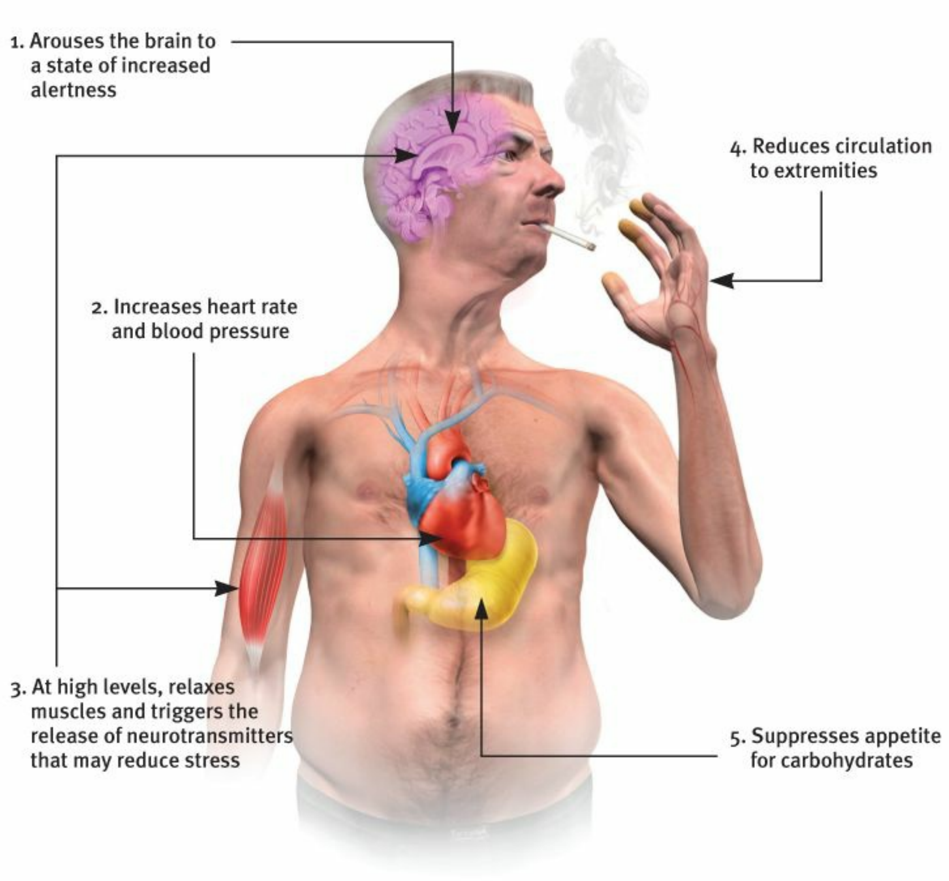

1. Arouses the brain to a state of increased alertness
2. Increases heart rate and blood pressure
3. At high levels, relaxes muscles and triggers the release of neurotransmitters that may reduce stress
4. Reduces circulation to extremities
5. Suppresses appetite for carbohydrates

Figure 25.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 25.2 Where there's smoke . . . : The physiological effects of nicotine

Nicotine reaches the brain within 7 seconds, twice as fast as intravenous heroin. Within minutes, the amount in the blood soars.

Pictorial Press Ltd/Alamy

Nic-A-Teen Virtually nobody starts smoking past the vulnerable teen years. Eager to hook customers whose addiction will give them business for years to come, cigarette companies target teens. Portrayals of smoking by popular actors, such as Scarlett Johansson in *Hail, Caesar!*, tempt teens to imitate.

These rewards keep people smoking, even among the 3 in 4 smokers who wish they could stop (Newport, 2013). Each year, fewer than 1 in 7 who want to quit will be able to resist. Even those who know they are committing slow-motion suicide may be unable to stop (Saad, 2002). Asked “If you had to do it all over again, would you start smoking?” more than 85 percent of adult smokers have answered *No* (Slovic et al., 2002).

Nevertheless, repeated attempts seem to pay off. Half of all Americans who have ever smoked have quit, sometimes aided by a nicotine replacement drug and with encouragement from a counselor or support group. Some researchers argue that it is best to quit abruptly — to go “cold turkey” (Lindson-Hawley et al., 2016). Others suggest that success is equally likely whether smokers quit abruptly or gradually (Fiore et al., 2008; Lichtenstein et al., 2010). For those who endure, the acute craving and withdrawal symptoms gradually dissipate over the ensuing six months (Ward et al., 1997). After a year’s abstinence, only 10 percent will relapse in the next year (Hughes, 2010). These nonsmokers may live not only healthier but also happier lives. Smoking correlates with higher rates of depression, chronic disabilities, and divorce (Doherty & Doherty, 1998; Edwards & Kendler, 2012; Vita et al., 1998). Healthy living seems to add both years to life and life to years.

> *Humorist Dave Barry (1995) recalling why he smoked his first cigarette the summer he turned 15:*
>
> “*Arguments against smoking: ‘It’s a repulsive addiction that slowly but surely turns you into a gasping, gray-skinned, tumor-ridden invalid, hacking up brownish gobs of toxic waste from your one remaining lung.’ Arguments for smoking: ‘Other teenagers are doing it.’ Case closed! Let’s light up!*”

✓ Check Your Understanding

Ask Yourself

- Have you ever relied on caffeinated drinks to stay awake for a late-night study session, and then struggled to fall asleep afterward? How do you think this pattern affects next-day performance in school? How might you plan your study sessions to avoid this?

Test Yourself

- What withdrawal symptoms should your friend expect when she finally decides to quit smoking?

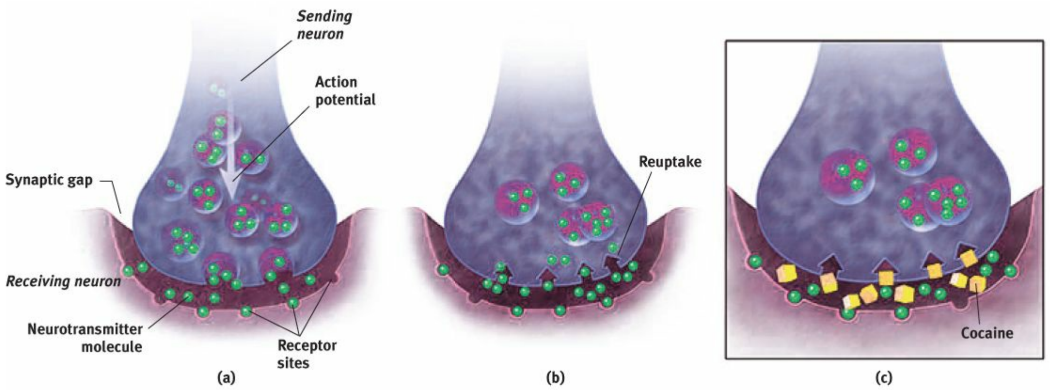
Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Cocaine

Cocaine is a powerful and addictive stimulant derived from the coca plant. The recipe for Coca-Cola originally included an extract of that plant, creating a cocaine tonic for tired elderly people. Between 1896 and 1905, Coke was indeed “the real thing.” But no longer. Cocaine is now snorted, injected, or smoked (sometimes as the street drug *crack cocaine*, a faster-working crystallized form that produces a briefer but more intense high, followed by a more intense crash). It enters the bloodstream quickly, producing a rush of euphoria that depletes the brain’s supply of the neurotransmitters dopamine, serotonin, and norepinephrine (**Figure 25.3**). Within the hour, a crash of agitated depression follows as the drug’s effect wears off. After several hours, the craving for more wanes, only to return several days later (Gawin, 1991).

cocaine

a powerful and addictive stimulant derived from the coca plant; produces temporarily increased alertness and euphoria.



(a)
Neurotransmitters carry a message from a sending neuron across a synapse to receptor sites on a receiving neuron.

(b)
The sending neuron normally reabsorbs excess neurotransmitter molecules, a process called *reuptake*.

(c)
By binding to the sites that normally reabsorb neurotransmitter molecules, cocaine blocks reuptake of dopamine, norepinephrine, and serotonin (Ray & Ksir, 1990). The extra neurotransmitter molecules therefore remain in the synapse, intensifying their normal mood-altering effects and producing a euphoric rush. When the cocaine level drops, the absence of these neurotransmitters produces a crash.

Figure 25.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 25.3 Cocaine euphoria and crash

> “*Cocaine makes you a new man. And the first thing that new man wants is more cocaine.*”
>
> *Comedian George Carlin (1937–2008)*

In situations that trigger aggression, ingesting cocaine may heighten reactions. Caged rats fight when given foot shocks, and they fight even more when given cocaine *and* foot shocks. Likewise, humans who voluntarily ingest high doses of cocaine in laboratory experiments impose higher shock levels on a presumed opponent than do those receiving a placebo (Licata et al., 1993). Cocaine use may also lead to emotional disturbances, suspiciousness, convulsions, cardiac arrest, or respiratory failure.

AP® EXAM TIP

Figure 25.3 is an excellent review of how neurotransmitters work. If there is any part of this that you don’t understand, head back to Module 9 for a complete explanation. Neural communication is a topic that has been on the AP® exam.

Cocaine’s psychological effects depend in part on the dosage and form consumed, but the situation and the user’s expectations and personality also play a role. Given a placebo, cocaine users who *thought* they were taking cocaine often had a cocaine-like experience (Van Dyke & Byck, 1982).

In national surveys, 2.5 percent of U.S. high school seniors and 6 percent of British 18- to 24-year-olds reported having tried cocaine during the past year (ACMD, 2009; Johnston et al., 2017). Of those, nearly half had smoked *crack.*

Methamphetamine

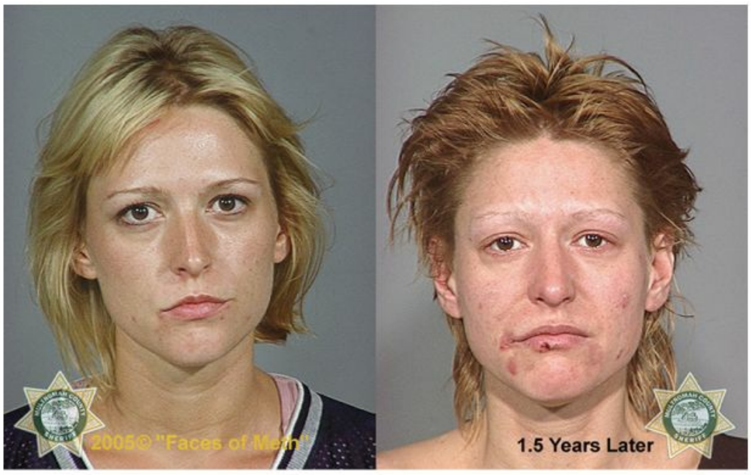
Amphetamines stimulate neural activity. As body functions speed up, the user’s energy rises and mood soars. Amphetamines are the parent drug for the highly addictive **methamphetamine**, which is chemically similar but has greater effects (NIDA, 2002, 2005). Methamphetamine triggers the release of the neurotransmitter dopamine, which stimulates brain cells that enhance energy and mood, leading to 8 hours or so of heightened energy and euphoria. Its aftereffects may include irritability, insomnia, hypertension, seizures, social isolation, depression, and occasional violent outbursts (Homer et al., 2008). Over time, methamphetamine may reduce baseline dopamine levels, leaving the user with continuing depressed functioning.

amphetamines

drugs, such as methamphetamine, that stimulate neural activity, causing accelerated body functions and associated energy and mood changes.

methamphetamine

a powerfully addictive drug that stimulates the central nervous system, with accelerated body functions and associated energy and mood changes; over time, appears to reduce baseline dopamine levels.



Multnomah County Sheriff's Office

Dramatic drug-induced decline In the 18 months between these two mug shots, this woman's methamphetamine addiction led to obvious physical changes.

Bill Greenblatt/United Press International (UPI)/Newscom

Meth bust As use of the dangerously addictive stimulant methamphetamine has increased, enforcement agencies have increased their efforts to snuff out the labs that produce it.

Ecstasy

Ecstacy, a street name for **MDMA** (methylenedioxymethamphetamine, also known in its powder form as *Molly*), is both a stimulant and a mild hallucinogen. As an amphetamine derivative, Ecstasy triggers dopamine release, but its major effect is releasing stored serotonin and blocking its reuptake, thus prolonging serotonin’s feel-good flood (Braun, 2001). Users feel the effect about a half-hour after taking an Ecstasy pill. For 3 or 4 hours, they experience high energy, emotional elevation, and (given a social context) connectedness with those around them (“I love everyone!”).

Ecstasy (MDMA)
a synthetic stimulant and mild hallucinogen. Produces euphoria and social intimacy, but with short-term health risks and longer-term harm to serotonin-producing neurons and to mood and cognition.

During the 1990s, Ecstasy’s popularity soared as a “club drug” taken at nightclubs and all-night dance parties (Landry, 2002). The drug’s popularity crosses national borders, with an estimated 60 million tablets consumed annually in Britain (ACMD, 2009). There are, however, reasons not to be ecstatic about Ecstasy. One is its dehydrating effect, which — when combined with prolonged dancing — can lead to severe overheating, increased blood pressure, and death. Another is that long-term, repeated leaching of brain serotonin can damage serotonin-producing neurons, leading to decreased output and increased risk of permanently depressed mood (Croft et al., 2001; McCann et al., 2001; Roiser et al., 2005). Ecstasy also suppresses the immune system, impairs memory, slows thought, and disrupts sleep by interfering with serotonin’s control of the circadian clock (Laws & Kokkalis, 2007; Schilt et al., 2007; Wagner et al., 2012). Ecstasy delights for the night but dispirits the morrow.

Hallucinogens

25-5 What are *hallucinogens*, and what are their effects?

Hallucinogens distort perceptions and evoke sensory images in the absence of sensory input (which is why these drugs are also called *psychedelics*, meaning "mind-manifesting"). Some, such as LSD and MDMA (Ecstasy), are synthetic. Others, including the mild hallucinogen marijuana, are natural substances.

hallucinogens

psychedelic ("mind-manifesting") drugs, such as LSD, that distort perceptions and evoke sensory images in the absence of sensory input.

Whether provoked to hallucinate by drugs, loss of oxygen, or extreme sensory deprivation, the brain hallucinates in basically the same way (Siegel, 1982). The experience typically begins with simple geometric forms, such as a lattice, cobweb, or spiral. The next phase consists of more meaningful images; some may be superimposed on a tunnel or funnel, others may be replays of past emotional experiences. Brain scans of people on an LSD trip reveal that their visual cortex becomes hypersensitive and strongly connected to their brain's emotion centers (Carhart-Harris et al., 2016). As the hallucination peaks, people frequently feel separated from their body and experience dreamlike scenes. Their sense of self dissolves, which also dissolves the border between themselves and the external world (Lebedev et al., 2015).

These sensations are strikingly similar to the **near-death experience**, an altered state of consciousness reported by about 10 to 15 percent of those revived from cardiac arrest (Agrillo, 2011; Greyson, 2010; Parnia et al., 2014). Many describe visions of tunnels (**Figure 25.4**), bright lights or beings of light, a replay of old memories, and out-of-body sensations (Siegel, 1980). These experiences can later enhance spirituality and promote feelings of personal growth (Khanna & Greyson, 2014, 2015). Given that oxygen deprivation and other insults to the brain are known to produce hallucinations, it is difficult to resist wondering whether a brain under stress manufactures the near-death experience. During epileptic seizures and migraines, people may experience similar hallucinations of geometric patterns (Billock & Tsou, 2012). So have solitary sailors and polar explorers while enduring monotony, isolation, and cold (Suedfeld & Mocellin, 1987). The philosopher-neuroscientist Patricia Churchland (2013, p. 70) surmises that such experiences represent “neural funny business.”

near-death experience

an altered state of consciousness reported after a close brush with death (such as cardiac arrest); often similar to drug-induced hallucinations.

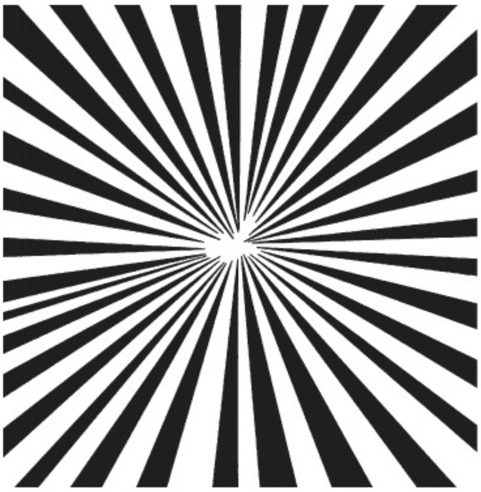


Figure 25.4
NUMAX3D/Shutterstock

Figure 25.4 Near-death vision or hallucination?

Psychologist Ronald Siegel (1977) reported that people under the influence of hallucinogenic drugs often see “a bright light in the center of the field of vision. . . . The location of this point of light create[s] a tunnel-like perspective.” This is very similar to others’ near-death experiences.

LSD

Albert Hofmann, a chemist, created — and on one Friday afternoon in April 1943 accidentally ingested — **LSD** (lysergic acid diethylamide). The result — “an uninterrupted stream of fantastic pictures, extraordinary shapes with intense, kaleidoscopic play of colors” — reminded him of a childhood mystical experience that had left him longing for another glimpse of “a miraculous, powerful, unfathomable reality” (Siegel, 1984; Smith, 2006).

LSD

a powerful hallucinogenic drug; also known as acid *(lysergic acid diethylamide).*

The emotions of an LSD (or *acid*) trip vary from euphoria to detachment to panic. Users’ mood and expectations (their “high hopes”) color the emotional experience, but the perceptual distortions and hallucinations have some commonalities.

Marijuana

The straight dope on marijuana: Marijuana leaves and flowers contain **THC** (delta-9-tetrahydrocannabinol). Whether smoked (getting to the brain in about 7 seconds) or eaten (traveling at a slower, unpredictable rate), THC produces a mix of effects. Synthetic marijuana (*K2*, also called *Spice*) mimics THC. Its harmful side effects can include agitation and hallucinations (Fattore, 2016; Sherif et al., 2016).

THC

the major active ingredient in marijuana; triggers a variety of effects, including mild hallucinations.

Marijuana is usually classified as a mild hallucinogen because it amplifies sensitivity to colors, sounds, tastes, and smells. But like alcohol, marijuana also relaxes, disinhibits, and may produce a euphoric high. Both alcohol and marijuana impair the motor coordination, perceptual skills, and reaction time necessary for safely operating an automobile or other machine. “THC causes animals to misjudge events,” reported Ronald Siegel (1990, p. 163). “Pigeons wait too long to respond to buzzers or lights that tell them food is available for brief periods; and rats turn the wrong way in mazes."

Marijuana and alcohol also differ. The body eliminates alcohol within hours. THC and its by-products linger in the body for more than a week, which means that regular users experience less abrupt withdrawal and may achieve a high with smaller-than-usual drug amounts. This is the opposite of typical tolerance, in which repeat users need larger doses to feel the same effect.

After considering more than 10,000 scientific reports, the U.S. National Academies of Sciences, Engineering, and Medicine (2017) concluded that marijuana use

- alleviates chronic pain and chemotherapy-related nausea,
- is not associated with tobacco-related cancers, such as lung cancer,
- is predictive of increased risk of traffic accidents, chronic bronchitis, psychosis, social anxiety disorder, and suicidal thoughts, and
- likely contributes to impaired attention, learning, and memory, and possibly to academic underachievement.

A marijuana user's experience can vary with the situation. If the person feels anxious or depressed, marijuana may intensify the feelings. The more often the person uses marijuana, especially during adolescence, the greater the risk of anxiety, depression, psychosis, or addiction (Bambico et al., 2010; Hurd et al., 2013; Volkow et al., 2016).

Some U.S. states and countries have passed laws legalizing the possession of small quantities of marijuana. Greater legal acceptance may help explain why Americans' marijuana use nearly doubled between 2013 and 2016, from 7 to 13 percent (McCarthy, 2016).

* * *

Despite their differences, the psychoactive drugs summarized in **Table 25.2** share a common feature: They trigger negative aftereffects that offset their immediate positive effects and grow stronger with repetition. This helps explain both tolerance and withdrawal.

TABLE 25.2 A Guide to Selected Psychoactive Drugs

Drug	**Type**	**Pleasurable Effects**	**Negative Aftereffects**
Alcohol	Depressant	Initial high followed by relaxation and disinhibition	Depression, memory loss, organ damage, impaired reactions
Heroin	Depressant	Rush of euphoria, relief from pain	Depressed physiology, agonizing withdrawal
Caffeine	Stimulant	Increased alertness and wakefulness	Anxiety, restlessness, and insomnia in high doses; uncomfortable withdrawal
Nicotine	Stimulant	Arousal and relaxation, sense of well-being	Heart disease, cancer
Cocaine	Stimulant	Rush of euphoria, confidence, energy	Cardiovascular stress, suspiciousness, depressive crash
Methamphetamine	Stimulant	Euphoria, alertness, energy	Irritability, insomnia, hypertension, seizures
Ecstasy (MDMA)	Stimulant; mild hallucinogen	Emotional elevation, disinhibition	Dehydration, overheating, depressed mood, impaired cognitive and immune functioning
LSD	Hallucinogen	Visual “trip”	Risk of panic
Marijuana (THC)	Mild hallucinogen	Enhanced sensation, relief of pain, distortion of time, relaxation	Impaired learning and memory, increased risk of psychological disorders

To learn about the influences on drug use, see Module 81.

✓ Check Your Understanding

Ask Yourself

- How well could you describe each category of psychoactive drugs to a classmate?

Test Yourself

- Why do tobacco companies try so hard to get customers hooked as teens?
- “How strange would appear to be this thing that men call pleasure! And how curiously it is related to what is thought to be its opposite, pain! . . . Wherever the one is found, the other follows up behind.” (Plato, *Phaedo,* fourth century B.C.E.)

  How does this pleasure-pain description apply to the repeated use of psychoactive drugs?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 25 REVIEW

25-1 What are *substance use disorders?*

- Those with a *substance use disorder* experience continued substance craving and use despite significant life disruption and/or physical risk.
- *Psychoactive drugs* are any chemical substances that alter perceptions and moods.

25-2 What roles do tolerance and addiction play in substance use disorders, and how has the concept of addiction changed?

- Psychoactive drugs may produce *tolerance* — requiring larger doses to achieve the desired effect — and *withdrawal* — significant discomfort, due to strong addictive cravings, accompanying efforts to quit.
- Addiction prompts users to crave the drug and to continue use despite known adverse consequences. Psychologists try to avoid overuse of "addiction" to label driven, excessive behaviors. However, there are some behavior addictions (such as gambling disorder) in which behaviors become compulsive and dysfunctional.

25-3 What are *depressants,* and what are their effects?

- *Depressants*, such as alcohol, *barbiturates*, and the *opiates* (which include narcotics), dampen neural activity and slow body functions.
- Alcohol disinhibits, increasing the likelihood that we will act on our impulses, whether harmful or helpful. It also impairs judgment by slowing neural processing, disrupts memory processes by suppressing REM sleep, and reduces self-awareness and self-control. User expectations strongly influence alcohol's behavioral effects.
- Alcohol can shrink the brain in those with *alcohol use disorder* (marked by tolerance, withdrawal if use is suspended, and a drive to continue

problematic use).

25-4 What are *stimulants,* and what are their effects?

- *Stimulants* — including caffeine, *nicotine, cocaine*, the *amphetamines, methamphetamine*, and *Ecstasy* — excite neural activity and speed up body functions, triggering energy and mood changes. All are highly addictive.
- *Nicotine's* effects make smoking a difficult habit to kick, yet repeated attempts to quit seem to pay off.
- Cocaine gives users a fast high, followed shortly by a crash. Its risks include cardiovascular stress and suspiciousness.
- *Amphetamines* stimulate neural activity. Use of *methamphetamines* may permanently reduce dopamine production.
- *Ecstasy (MDMA)* is a combined stimulant and mild hallucinogen that produces euphoria and feelings of intimacy. Its users risk immune system suppression, permanent damage to mood and memory, and (if taken during physical activity) dehydration and escalating body temperatures.

25-5 What are *hallucinogens,* and what are their effects?

- *Hallucinogens* — such as *LSD* and marijuana — distort perceptions and evoke *hallucinations* (sensory images in the absence of sensory input), some of which resemble the altered consciousness of *near-death experiences.*
- The user's mood and expectations influence the effects of LSD, but common experiences are hallucinations and emotions varying from euphoria to panic.
- Marijuana's main ingredient, *THC,* may trigger feelings of disinhibition, euphoria, relaxation, relief from pain and chemotherapy-related nausea, and intense sensitivity to sensory stimuli. Marijuana use is predictive of increased risk of traffic accidents, chronic bronchitis, psychosis, social

anxiety disorder, and suicidal thoughts; and likely contributes to impaired attention, learning, memory, and possibly to academic underachievement.

Multiple-Choice Questions

1. Which of the following represents drug tolerance?

a. Hans has grown to accept the fact that his wife likes to have a beer with her dinner, even though he personally does not approve of the use of alcohol.
b. José often wakes up with a headache that lasts until he has his morning cup of coffee.
c. Pierre enjoys the effect of marijuana and is now using the drug several times a week.
d. Jacob had to increase the dosage of his pain medication when the old dosage no longer effectively controlled the pain from his chronic back condition.
e. Chau lost his job and is now homeless as a result of his drug use.

2. After taking a psychoactive drug for many years, Carl stops taking it. He finds withdrawal to be physically painful, because the drug that he had been taking caused his brain to stop producing its own endorphins. Which drug was he taking?

a. Nicotine
b. Marijuana
c. Cocaine
d. Methamphetamine
e. Heroin

3. Which stimulant causes high energy, emotional elation, dehydration, and damage to serotonin-producing neurons?

a. Barbiturate
b. Nicotine
c. Ecstasy

d. Caffeine
e. LSD

4. Which of the following statements is true of alcohol?

a. Alcohol is a hallucinogen, because it makes people believe things that are not true.
b. Alcohol is a depressant, because it causes people to feel sad when under its influence.
c. Alcohol is a stimulant, because people do foolish things while under its influence.
d. Alcohol is a depressant, because it calms neural activity and slows body function.
e. Alcohol is a stimulant, because it increases the heart rate as consumption increases.

5. What can be expected in someone who is a frequent user of marijuana?

a. There will be an increased production of dopamine in the brain.
b. They will need to consume larger doses of the drug to feel its effects.
c. They will experience a dangerously elevated heart rate.
d. They will experience vivid hallucinations.
e. They will require less of the drug to feel its effects as the drug builds up in their system.

Practice FRQs

1. Explain alcohol use disorder by using the following terms:

- Tolerance
- Craving
- Withdrawal

Answer

1 point: A person who regularly consumes alcohol develops tolerance—they need to consume more and more alcohol to achieve the same pleasurable effects. Tolerance increases the risk of developing alcohol use disorder Pages 254, 255

1 point: A person with alcohol use disorder will crave the drug, even when use is accompanied by aversive consequences. Pages 253, 254

1 point: A person with alcohol use disorder will suffer the negative symptoms of withdrawal when they stop drinking. Pages 254, 255

2. Many teens believe that recreational use of drugs does not have negative long-term effects. Explain a negative long-term effect, other than addiction, for each of the following drugs:

- Alcohol
- Marijuana
- Nicotine

(3 points)

UNIT V REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

consciousness, p. 224

hypnosis, p. 225

posthypnotic suggestion, p. 226

dissociation, p. 227

sleep, p. 231

circadian [ser-KAY-dee-an] rhythm, p. 231

REM sleep, p. 232

alpha waves, p. 232

NREM sleep, p. 233

hallucinations, p. 233

hypnagogic sensations, p. 233

delta waves, p. 234

suprachiasmatic nucleus (SCN), p. 235

insomnia, p. 244

narcolepsy, p. 245

sleep apnea, p. 245

night terrors, p. 246

dream, p. 247

manifest content, p. 248

latent content, p. 248

REM rebound, p. 251

psychoactive drug, p. 253

substance use disorder, p. 253

tolerance, p. 255

withdrawal, p. 255

depressants, p. 255

alcohol use disorder, p. 255
barbiturates, p. 257
opiates, p. 257
stimulants, p. 257
nicotine, p. 258
cocaine, p. 259
amphetamines, p. 260
methamphetamine, p. 260
Ecstasy (MDMA), p. 261
hallucinogens, p. 261
near-death experience, p. 262
LSD, p. 262
THC, p. 262

KEY CONTRIBUTORS TO REMEMBER

William James, p. 224
Ernest Hilgard, p. 227
Sigmund Freud, p. 248

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. While engaged in an argument with his brother, a man suddenly falls asleep. With which sleep disorder is he most likely to be diagnosed?

a. Sleep apnea
b. Insomnia
c. Night terrors
d. Sleepwalking
e. Narcolepsy

2. Which of the following are visible on the EEG of a person in NREM-3 sleep?

a. Sleep spindles
b. REM
c. Alpha waves
d. SCN
e. Delta waves

3. Hadley is complaining to her physician that she has great difficulty falling asleep, and that when she does fall asleep, she regularly wakens later during the night. She will most likely be diagnosed with

a. insomnia.
b. narcolepsy.
c. sleep apnea.
d. night terrors.
e. sleepwalking.

4. What is the pineal gland’s role in sleep?

a. Activating the suprachiasmatic nucleus
b. The production of melatonin
c. The location of hypnagogic sensations
d. Remembering dreams upon waking
e. Emitting alpha waves

5. As part of a sleep study, researchers notice bursts of rapid, rhythmic brain-wave activity called _____ and determine that Jane is in NREM-2 sleep.

a. hallucinations
b. circadian rhythms
c. alpha waves
d. sleep spindles
e. delta waves

6. Increasing amounts of paradoxical sleep following a period of sleep deprivation is known as what?

a. Circadian sleep

b. Sleep shifting
c. Narcolepsy
d. Sleep apnea
e. REM rebound

7. Which of these drugs acts as both a stimulant and a hallucinogen, causes dangerous dehydration in the short term, and causes serotonin disruption in the long term?

a. LSD
b. Ecstasy
c. Alcohol
d. Cocaine
e. Caffeine

8. Recent research most consistently supports the effectiveness of hypnosis in which of the following areas?

a. Pain relief
b. Recovery of lost memories
c. Reduction of sleep deprivation
d. Forcing people to act against their will
e. Cessation of smoking

9. Which drug is incorrectly matched with its category?

a. Alcohol; stimulant
b. LSD; hallucinogen
c. Amphetamine; stimulant
d. THC; hallucinogen
e. Nicotine; stimulant

0. Jarod’s muscles are relaxed, his body is basically paralyzed, and he is hard to awaken. Which sleep stage is Jarod probably experiencing?

a. NREM-1
b. NREM-2
c. NREM-3

d. REM
e. Alpha

1. The effects of opiates are similar to the effects of which neurotransmitter?

a. Serotonin
b. Endorphins
c. GABA
d. Norepinephrine
e. Acetylcholine

2. Slowed reactions, slurred speech, and decreased skill performance are associated with abuse of which drug?

a. Nicotine
b. Methamphetamine
c. Caffeine
d. Alcohol
e. Ecstasy

3. Ernest Hilgard used the term _____ to describe a split between different levels of consciousness.

a. selective attention
b. REM sleep
c. delta waves
d. spindles
e. dissociation

4. Carla has agreed to take part in a sleep study. The researchers are most likely using a(n) _____ to measure her brain waves as she sleeps.

a. MRI
b. CT scan
c. PET scan
d. EEG
e. EKG

5. Which term describes the brain’s adaptation to a drug’s chemistry, requiring larger and larger doses to experience the same effect?

a. Withdrawal
b. Tolerance
c. Addiction
d. Substance use disorder
e. Disinhibiting

Free-Response Questions

1. Explain the biological changes typically associated with the following:

- Sleep deprivation
- REM sleep
- Tolerance
- Opiate use

Rubric for Free Response Question 1

1 point: Sleep deprivation is associated with fatigue, irritability, impaired concentration, memory problems, depression, weight gain, joint pain, a suppressed immune system, and slowed performance (with greater vulnerability to accidents). Pages 241–244

1 point: REM sleep prompts rapid brain waves (similar to those of a nearly awake state), rapid and irregular breathing, aroused genitals, and relaxed muscles despite an active motor cortex. Pages 234–235

1 point: After repeated use of some drugs, the brain adapts to the drug’s chemistry and develops tolerance. As a result, more and more of the drug is needed to produce the same effect. Page 254

1 point: Opiate drugs depress neural functioning, which lessens pain and anxiety. Users also experience pupil constriction, slower breathing, lethargy, and, eventually, painful withdrawal symptoms as the brain loses its ability to produce endorphins (the body’s natural painkillers).

Page 257

2. After 10 years of smoking, Elaine is ready to quit. She pays a visit to a hypnotist in an effort to quit. How might the hypnotist use the following to help Elaine quit smoking?

   - Posthypnotic suggestion
   - Social influence theory of hypnosis

   Even though the hypnosis seems successful, Elaine is worried about the effects smoking had on her body and is interested in her health outlook now that she has quit. Provide one element of damage she has done to her body by smoking and one element of how her health will improve now that she has quit.

(4 points)

3. Consciousness has been defined and studied differently throughout the history of psychology. In your own words, explain how modern psychologists define consciousness, and explain how the following means of "altering" one's state of consciousness relate to your definition.

   - Hypnosis
   - Sleep stages
   - Dreams
   - Psychoactive drugs

(5 points)

UNIT VI Learning

Ariel Skelley/Getty Images

MODULES

26 How We Learn and Classical Conditioning

27 Operant Conditioning

28 Operant Conditioning’s Applications, and Comparison to Classical Conditioning

29 Biology, Cognition, and Learning

30 Observational Learning

In the early 1940s, University of Minnesota graduate students Marian Breland and Keller Breland witnessed the power of a new learning technology. Their mentor, B. F. Skinner, would become famous for *shaping* rat and pigeon behaviors by delivering well-timed rewards as the animals inched closer and closer to a desired behavior. Impressed by Skinner's results, the Brelands began shaping the behavior of cats, chickens, parakeets, turkeys, pigs, ducks, and hamsters (Bailey & Gillaspy, 2005). They eventually formed Animal Behavior Enterprises and spent the next half-century training more than 15,000 animals from 140 species for movies, traveling shows, amusement parks, corporations, and the government.

While writing about animal trainers, journalist Amy Sutherland wondered if shaping had uses closer to home (2006a,b). If baboons could be trained to skateboard and elephants to paint, might "the same techniques . . . work on that stubborn but lovable species, the American husband"? To find out, she trained her husband, Scott. Step by step, she "began thanking Scott if he threw one dirty shirt into the hamper. If he threw in two, I'd kiss him [and] as he basked in my appreciation, the piles became smaller." After two years of "thinking of my husband as an exotic animal species," she reported, "my marriage is far smoother, my husband much easier to love."

Like husbands and other animals, we learn from experience. Indeed, nature's most important gift may be our *adaptability*—our capacity to learn new behaviors that help us cope with our changing world. We can learn how to build grass huts or snow shelters, submarines or space stations, and thereby adapt to almost any environment.

Learning breeds hope. What is learnable we can potentially teach—a fact that encourages parents, educators, coaches, and animal trainers. What has been learned we can potentially change by new learning—an assumption that underlies counseling, psychotherapy, and rehabilitation programs. No matter how unhappy, or unsuccessful, or unloved we are, that need not be the end of our story.

No topic is closer to the heart of psychology than *learning*. In earlier units we considered how we learn to think critically, and the learning of visual perceptions and of a drug's expected effect. In Unit VII, we will see how the brain encodes, stores, retrieves, and ultimately uses learning, and how learning shapes our thinking and language. In later units we will see how learning affects our motivations and emotions, and our personalities and attitudes. Here in this unit we examine the heart of learning: classical conditioning, operant conditioning, the effects of biology and cognition on learning, and learning by observation.

▶ **Unit VI Overview Video**

Module **26 How We Learn and Classical Conditioning**

LEARNING TARGETS

- 26-1 Define *learning*, and identify some basic forms of learning.
- 26-2 Explain behaviorism’s view of learning.
- 26-3 Identify Pavlov, and describe the basic components of classical conditioning.
- 26-4 Identify the processes of *acquisition*, *extinction*, *spontaneous recovery*, *generalization*, and *discrimination* in classical conditioning.
- 26-5 Summarize why Pavlov’s work remains so important.
- 26-6 Describe some applications of Pavlov’s work to human health and well-being, and explain how Watson applied Pavlov’s principles to learned fears.

How Do We Learn?

26-1 How do we define *learning*, and what are some basic forms of learning?

By **learning**, we humans adapt to our environments. We learn to expect and prepare for significant events such as food or pain *(classical conditioning)*. We learn to repeat acts that bring rewards and avoid acts that bring unwanted results *(operant conditioning)*. We learn new behaviors by observing events and people, and through language, we learn things we have neither experienced nor observed *(cognitive learning)*. But *how* do we learn?

learning
the process of acquiring through experience new and relatively enduring information or behaviors.

More than 200 years ago, philosophers John Locke and David Hume echoed Aristotle’s conclusion from 2000 years earlier: We learn, first, by *association*. Our minds naturally connect events that occur in sequence. Suppose you see and smell freshly baked bread, eat some, and find it satisfying. The next time you see and smell fresh bread, you will expect that eating it will again be satisfying. So, too, with sounds. If you associate a sound with a frightening consequence, hearing the sound alone may trigger your fear. As one 4-year-old exclaimed after watching a TV character get mugged, “If I had heard that music, I wouldn’t have gone around the corner!” (Wells, 1981).

Learned associations often operate subtly:

- Give people a red pen (associated with error marking) rather than a black pen and, when correcting essays, they will spot more errors and give lower grades (Rutchick et al., 2010).
- When voting, people are more likely to support taxes to aid education if

their assigned voting place is in a school (Berger et al., 2008).

Learned associations also feed our habitual behaviors (Wood et al., 2014). Habits can form when we repeat behaviors in a given context—sleeping in a certain posture in bed, biting our nails in class, eating popcorn in a movie theater. As behavior becomes linked with the context, our next experience of that context will evoke our habitual response. Especially when we're mentally fatigued, we tend to fall back on our habits (Neal et al., 2013). That's true of both good habits (eating fruit) and bad (overindulging in candy) (Graybiel & Smith, 2014). To increase our self-control, and to connect our resolutions with positive outcomes, the key is forming "beneficial habits" (Galla & Duckworth, 2015).

How long does it take to form a beneficial habit? To find out, one British research team asked 96 university students to choose some healthy behavior (such as running before dinner or eating fruit with lunch), to do it daily for 84 days, and to record whether the behavior felt automatic (something they did without thinking and would find it hard not to do). On average, behaviors became habitual after about 66 days (Lally et al., 2010). Is there something you'd like to make a routine or essential part of your life? Just do it every day for two months, or a bit longer for exercise, and you likely will find yourself with a new habit. This happened for both of us—with a midday workout [DM] or late afternoon run [ND] having long ago become an automatic daily routine.

TRY THIS

Most of us would be unable to name the order of the songs on our favorite album or playlist. Yet, hearing the end of one piece cues (by association) an anticipation of the next. Likewise, when singing your national anthem, you associate the end of each line with the beginning of the next. (Pick a line out of the middle and notice how much harder it is to recall the *previous* line.)

Other animals also learn by association. Disturbed by a squirt of water, the sea slug *Aplysia* protectively withdraws its gill. If the squirts continue, as happens naturally in choppy water, the withdrawal response diminishes.

We say the slug **habituates**. (*Habituation* is what happens when repeated stimulation produces waning responsiveness.) But if the sea slug repeatedly receives an electric shock just after being squirted, its protective response to the squirt instead grows stronger. The animal has associated the squirt with the impending shock.

habituation

decreasing responsiveness with repeated exposure to a stimulus.

AP® EXAM TIP

The AP® exam could have you differentiate similar concepts from various units. For example, it’s easy to confuse habituation with sensory adaptation, a concept from Unit IV. Recall that sensory adaptation occurs when one of your sensory systems stops registering the presence of an unchanging stimulus—when you go swimming in a cool pool, for example, the water soon stops feeling cool. Habituation, like sensory adaptation, involves a diminished response, but in this case it’s a form of learning. If you’re exposed to the same stimulus over and over, your response decreases. A friend might sneak up and startle you by yelling “Boo!” You will probably startle less when he tries it again two minutes later. That’s habituation.

Complex animals can learn to associate their own behavior with its outcomes. An aquarium seal will repeat behaviors, such as slapping and barking, that prompt people to toss it a herring.

By linking two events that occur close together, both sea slugs and seals are exhibiting **associative learning**. The sea slug associates the squirt with an impending shock; the seal associates slapping and barking with a herring treat. Each animal has learned something important to its survival: anticipating the immediate future.

associative learning

learning that certain events occur together. The events may be two stimuli (as in classical conditioning) or a response and its consequence (as in operant conditioning).

This process of learning associations is *conditioning*. It takes two main forms:

- In *classical conditioning*, we learn to associate two stimuli and thus to anticipate events. (A **stimulus** is any event or situation that evokes a response.) We learn that a flash of lightning signals an impending crack of thunder; when lightning flashes nearby, we start to brace ourselves (**Figure 26.1**). We associate stimuli that we do not control, and we respond automatically (exhibiting **respondent behavior**).
- In *operant conditioning*, we learn to associate a response (our behavior) and its consequence. Thus we (and other animals) learn to repeat acts followed by good results (**Figure 26.2**) and avoid acts followed by bad results. These associations produce **operant behaviors** (which operate on the environment to produce a consequence).

stimulus

any event or situation that evokes a response.

respondent behavior

behavior that occurs as an automatic response to some stimulus.

operant behavior

behavior that operates on the environment, producing consequences.

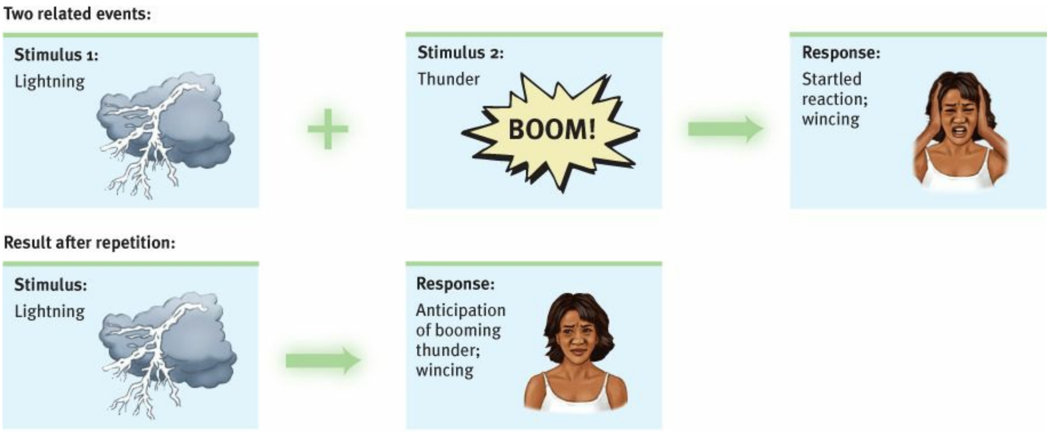

Two related events:
Stimulus 1:
Lightning
Stimulus 2:
Thunder
BOOM!
Response:
Startled reaction; wincing
Result after repetition:
Stimulus:
Lightning
Response:
Anticipation of booming thunder; wincing

Figure 26.1
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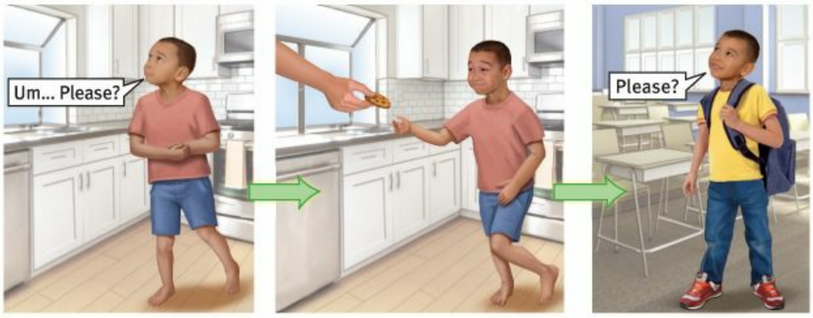
Figure 26.1 **Classical conditioning**


Um... Please?
Please?

(a) Response: Being polite (b) Consequence: Getting a treat (c) Behavior strengthened

Figure 26.2
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Figure 26.2 **Operant conditioning**

To simplify, we will explore these two types of associative learning separately. Often, though, they occur together. Consider the Japanese cattle ranch where the clever rancher outfitted his herd with electronic pagers which he called from his cell phone. After a week of training, the animals learned to associate two stimuli—the beep of their pager and the arrival of food (classical conditioning). But they also learned to associate their hustling to the food trough with the pleasure of eating (operant conditioning), which simplified the rancher's work. Classical conditioning + operant conditioning did the trick.

Conditioning is not the only form of learning. Through **cognitive learning**, we acquire mental information that guides our behavior. *Observational learning*, one form of cognitive learning, lets us learn from others' experiences. Chimpanzees, for example, sometimes learn behaviors merely by watching others perform them. If one animal sees another solve a puzzle and gain a food reward, the observer may perform the trick more quickly. So, too, in humans: We look and we learn.

cognitive learning

the acquisition of mental information, whether by observing events, by watching others, or through language.

> *"Watch your thoughts, they become words;*
> *watch your words, they become actions;*
> *watch your actions, they become habits;*
> *watch your habits, they become character;*
> *watch your character, for it becomes your destiny."*
>
> *Attributed to nineteenth-century fugitive cowboy Frank Outlaw, 1977*

Let's look more closely now at classical conditioning.

✓ Check Your Understanding

Ask Yourself

- Can you remember some example from your childhood of learning through classical conditioning—perhaps salivating at the sound or smell of some delicious food cooking in your family kitchen? Can you remember an example of operant conditioning, when you repeated (or decided not to repeat) a behavior because you liked (or hated) its consequences? Can you recall watching someone else perform some act and later repeating or avoiding that act?

Test Yourself

- Why are habits, such as having something sweet with that cup of coffee, so hard to break? (Hint: Think about learned associations.)

- As we develop, we learn cues that lead us to expect and prepare for good and bad events. We learn to repeat behaviors that bring rewards. And we watch others and learn. What do psychologists call these three types of learning?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

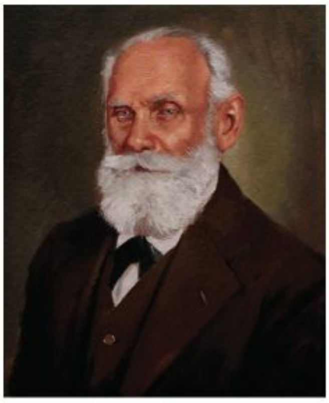
Classical Conditioning

26-2 What is behaviorism's view of learning?

For many people, the name Ivan Pavlov (1849–1936) rings a bell. His early twentieth-century experiments—now psychology's most famous research—are classics, and the phenomenon he explored we justly call **classical conditioning**.

classical conditioning

a type of learning in which we link two or more stimuli; as a result, to illustrate with Pavlov's classic experiment, the first stimulus (a tone) comes to elicit behavior (drooling) in anticipation of the second stimulus (food).



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Ivan Pavlov "Experimental investigation . . . should lay a solid foundation for a future true science of psychology" (1927).

Pavlov's work laid the foundation for many of psychologist John B. Watson's ideas. In searching for laws underlying learning, Watson (1913) urged his colleagues to discard reference to inner thoughts, feelings, and motives. The science of psychology should instead study how organisms respond to stimuli in their environments, said Watson: "Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods." Simply said, psychology should be an objective science based on observable behavior.

This view, which Watson called **behaviorism**, influenced North American psychology during the first half of the twentieth century. Pavlov and Watson both came to share a disdain for “mentalistic” concepts (such as consciousness) and a belief that the basic laws of learning were the same for all animals—whether sea slugs or dogs or humans. Few researchers today agree that psychology should ignore mental processes, but most do agree that classical conditioning is a basic form of learning by which all organisms adapt to their environment.

behaviorism

the view that psychology (1) should be an objective science that (2) studies behavior without reference to mental processes. Most research psychologists today agree with (1) but not with (2).

Pavlov’s Experiments

Flip It Video: Pavlov’s Experiments

26-3 Who was Pavlov, and what are the basic components of classical conditioning?

Pavlov was driven by a lifelong passion for research. After setting aside his initial plan to follow his father into the Russian Orthodox priesthood, Pavlov earned a medical degree at age 33 and spent the next two decades studying dogs’ digestive system. This work earned him Russia’s first Nobel Prize. But it was his novel experiments on learning, which consumed the last three decades of his life, that earned this feisty, intense scientist his place in history (Todes, 2014).

Pavlov’s new direction came when his creative mind seized on an incidental observation. Without fail, putting food in a dog’s mouth caused the animal to salivate. Moreover, the dog began salivating not only to the taste of the food, but also to the mere sight of the food, or the food dish, or the person delivering the food, or even at the sound of that person’s approaching footsteps. At first, Pavlov considered these “psychic secretions” an annoyance—until he realized they pointed to a simple but fundamental form of learning.

Pavlov and his assistants tried to imagine what the dog was thinking and feeling as it drooled in anticipation of the food. This only led them into fruitless debates. So, to explore the phenomenon more objectively, they experimented. To eliminate other possible influences, they isolated the dog in a small room, secured it in a harness, and attached a device to divert its saliva to a measuring instrument (**Figure 26.3**). From the next room, they presented food—first by sliding in a food bowl, later by blowing meat powder into the dog’s mouth at a precise moment. They then paired various **neutral stimuli (NS)**—events the dog could see or hear but didn’t associate with food—with food in the dog’s mouth. If a sight or sound regularly signaled the arrival of food, would the dog learn the link? If so, would it begin salivating in anticipation of the food?

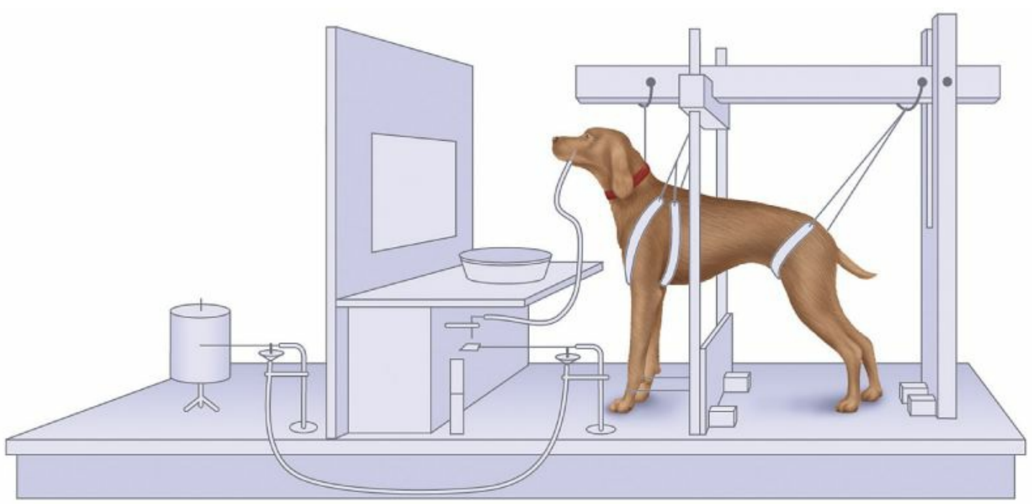

Figure 26.3
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Figure 26.3 Pavlov’s device for recording salivation

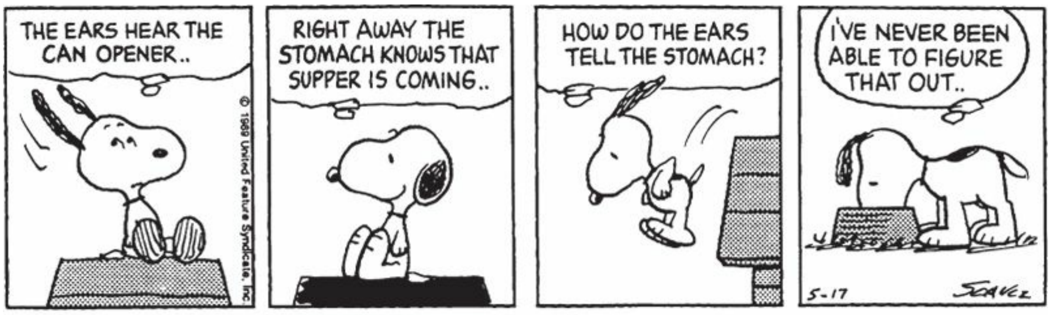
A tube in the dog’s cheek collects saliva, which is measured in a cylinder outside the chamber.

neutral stimulus (NS)

in classical conditioning, a stimulus that elicits no response before conditioning.

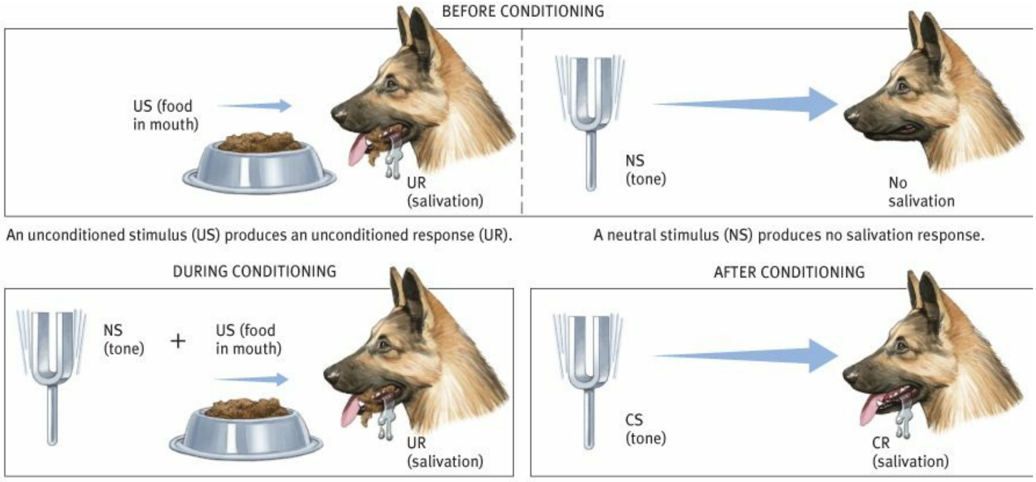
The answers proved to be *Yes* and *Yes*. Just before placing food in the dog’s mouth to produce salivation, Pavlov sounded a tone. After several pairings of tone and food, the dog, now anticipating the meat powder, began salivating to the tone alone. In later experiments, a buzzer,[1] a light, a touch on the leg, even the sight of a circle set off the drooling. (This procedure works with people, too. When hungry young Londoners viewed abstract figures before smelling peanut butter or vanilla, their brain soon responded in anticipation to the abstract images alone [Gottfried et al., 2003].)

Peanuts


THE EARS HEAR THE CAN OPENER..
© 1969 United Feature Syndicate, Inc
RIGHT AWAY THE STOMACH KNOWS THAT SUPPER IS COMING..
HOW DO THE EARS TELL THE STOMACH?
I'VE NEVER BEEN ABLE TO FIGURE THAT OUT..
5-17
SCHULZ

Peanuts reprinted with permission of United Features Syndicate

A dog does not learn to salivate in response to food in its mouth. Rather, food in the mouth automatically, *unconditionally*, triggers a dog’s salivary reflex (**Figure 26.4**). Thus, Pavlov called this drooling an **unconditioned response (UR)**. And he called the food an **unconditioned stimulus (US)**.


BEFORE CONDITIONING
US (food in mouth)
UR (salivation)
NS (tone)
No salivation
DURING CONDITIONING
NS (tone)
+
US (food in mouth)
UR (salivation)
AFTER CONDITIONING
CS (tone)
CR (salivation)

An unconditioned stimulus (US) produces an unconditioned response (UR).

A neutral stimulus (NS) produces no salivation response.

The US is repeatedly presented just after the NS. The US continues to produce a UR.

The previously neutral stimulus alone now produces a conditioned response (CR), thereby becoming a conditioned stimulus (CS).

Figure 26.4
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Figure 26.4 Pavlov's classic experiment

Pavlov presented a neutral stimulus (a tone) just before an unconditioned stimulus (food in mouth). The neutral stimulus then became a conditioned stimulus, producing a conditioned response.

unconditioned response (UR)

in classical conditioning, an unlearned, naturally occurring response (such as salivation) to an unconditioned stimulus (US) (such as food in the mouth).

unconditioned stimulus (US)

in classical conditioning, a stimulus that unconditionally—naturally and automatically—triggers an unconditioned response UR).

Salivation in response to a tone, however, is learned. It is *conditional* upon the dog's associating the tone with the food. Thus, we call this response the **conditioned response (CR)**. The stimulus that used to be neutral (in this case, a previously meaningless tone that now triggers salivation) is the **conditioned stimulus (CS)**. Distinguishing these two kinds of stimuli and responses is easy: Conditioned = learned; *un*conditioned = *un*learned.

conditioned response (CR)
in classical conditioning, a learned response to a previously neutral (but now conditioned) stimulus (CS).

conditioned stimulus (CS)
in classical conditioning, an originally neutral stimulus that, after association with an unconditioned stimulus (US), comes to trigger a conditioned response (CR).

If Pavlov’s demonstration of associative learning was so simple, what did he do for the next three decades? What discoveries did his research factory publish in his 532 papers on salivary conditioning (Windholz, 1997)? He and his associates explored five major conditioning processes: *acquisition, extinction, spontaneous recovery, generalization,* and *discrimination.*

✓ Check Your Understanding

Ask Yourself

- Do Pavlov’s experiments, showing that dogs learned to anticipate meat powder, surprise you? Why or why not?

Test Yourself

- An experimenter sounds a tone just before delivering an air puff that causes your eye to blink. After several repetitions, you blink to the tone alone. What is the NS? The US? The UR? The CS? The CR?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Acquisition

26-4 In classical conditioning, what are the processes of *acquisition, extinction, spontaneous recovery, generalization,* and

discrimination?

To understand the **acquisition**, or initial learning, of the stimulus-response relationship, Pavlov and his associates wondered: How much time should elapse between presenting the NS (the tone, the light, the touch) and the US (the food)? In most cases, not much—half a second usually works well.

acquisition
in classical conditioning, the initial stage, when one links a neutral stimulus and an unconditioned stimulus so that the neutral stimulus begins triggering the conditioned response. In operant conditioning, the strengthening of a reinforced response.

What do you suppose would happen if the food (US) appeared before the tone (NS) rather than after? Would conditioning occur? Not likely. Conditioning usually won't occur when the NS follows the US. *Remember, classical conditioning is biologically adaptive because it helps humans and other animals prepare for good or bad events.* To Pavlov's dogs, the originally neutral tone became a CS after signaling an important biological event—the arrival of food (US). To deer in the forest, the snapping of a twig (CS) may signal a predator's approach (US).

Research on male Japanese quail shows how a CS can signal another important biological event (Domjan, 1992, 1994, 2005). Just before presenting an approachable female quail, the researchers turned on a red light. Over time, as the red light continued to herald the female's arrival, the light alone caused the male quail to become excited. They developed a preference for their cage's red-light district, and when a female appeared, they mated with her more quickly and released more semen and sperm (Matthews et al., 2007). This capacity for classical conditioning supports reproduction.

Eric Isselee/Shutterstock

AP® EXAM TIP

You may find it helpful to note that spontaneous recovery is, in fact, spontaneous (Figure 26.6). Notice that the extinguished conditioned response returns without any additional pairing with the unconditioned stimulus. It is not a form of acquisition.

Sexual conditioning also occurs in rats. When their early sexual experiences are with partners scented with a peculiar odor, rats later display a preference for similarly scented partners (Pfaus et al., 2012). In humans, too, objects, smells, and sights associated with sexual pleasure—even a geometric figure, in one experiment—can become conditioned stimuli for sexual arousal (Byrne, 1982; Hoffman, 2012). Onion breath does not usually produce sexual arousal. But when repeatedly paired with a passionate kiss, it can become a CS and do just that (**Figure 26.5**). The larger lesson: *Conditioning helps an animal survive and reproduce—by responding to cues that help it gain food, avoid dangers, locate mates, and produce offspring* (Hollis, 1997). Learning makes for yearning.

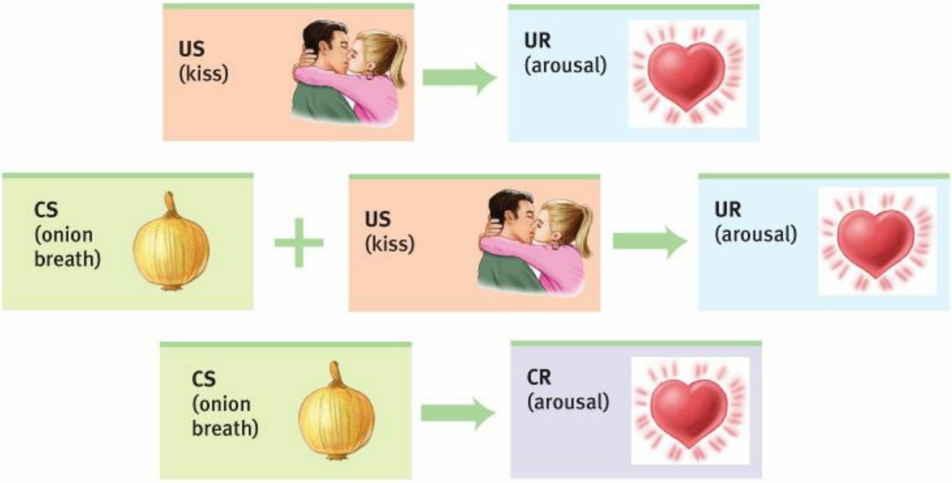

Figure 26.5
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Figure 26.5 An unexpected CS

Psychologist Michael Tirrell (1990) recalled: "My first girlfriend loved onions, so I came to associate onion breath with kissing. Before long, onion breath sent tingles up and down my spine. Oh what a feeling!"

FYI

Remember:

NS = **N**eutral **S**timulus

US = **U**nconditioned **S**timulus

UR = **U**nconditioned **R**esponse

CS = **C**onditioned **S**timulus

CR = **C**onditioned **R**esponse

Through **higher-order conditioning**, a new NS can become a new CS without the presence of a US. All that's required is for it to become associated with a previously conditioned stimulus. If a tone regularly signals food and produces salivation, then a light that becomes associated with the tone (light → tone → food) may also begin to trigger salivation. Although this higher-order conditioning (also called *second-order conditioning*) tends to be weaker than first-order conditioning, it influences our everyday lives. Imagine that something makes us very afraid (perhaps a guard dog associated with a previous dog bite). If something else, such as the sound of a barking dog, brings that guard dog to mind, the bark alone may make us feel a little afraid.

higher-order conditioning

a procedure in which the conditioned stimulus in one conditioning experience is paired with a new neutral stimulus, creating a second (often weaker) conditioned stimulus. For example, an animal that has learned that a tone predicts food might then learn that a light predicts the tone and begin responding to the light alone. (Also called *second-order conditioning*.)

Extinction and Spontaneous Recovery

What would happen, Pavlov wondered, if, after conditioning, the CS occurred repeatedly without the US? If the tone sounded again and again, but no food appeared, would the tone still trigger salivation? The answer was mixed. The dogs salivated less and less, a reaction known as **extinction**. Extinction is the diminished response that occurs when the CS (tone) no longer signals an impending US (food). But a different picture emerged when Pavlov allowed several hours to elapse before sounding the tone again. After the delay, the dogs would again begin salivating to the tone (**Figure 26.6**). This **spontaneous recovery**—the reappearance of a (weakened) CR after a pause—suggested to Pavlov that extinction was suppressing the CR rather than eliminating it.

extinction

the diminishing of a conditioned response; occurs in classical conditioning when an unconditioned stimulus (US) does not follow a conditioned stimulus (CS); occurs in operant conditioning when a response is no longer reinforced.

spontaneous recovery

the reappearance, after a pause, of an extinguished conditioned response.

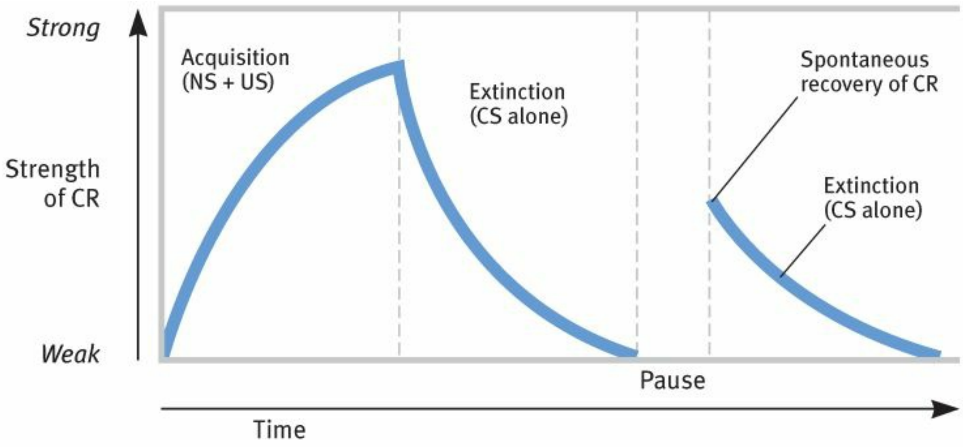

Figure 26.6
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Figure 26.6 Idealized curve of acquisition, extinction, and spontaneous recovery

The rising curve shows the CR rapidly growing stronger as the NS becomes a CS due to repeated pairing with the US *(acquisition)*. The CR then weakens rapidly as the CS is presented alone *(extinction)*. After a pause, the (weakened) CR reappears *(spontaneous recovery)*.

✓ Check Your Understanding

Ask Yourself

- Psychologist Michael Tirrell recalled coming to associate his girlfriend's onion breath with arousal. Can you remember ever experiencing something that would normally be neutral (or even unpleasant) that came to mean something special?

Test Yourself

- If the aroma of a baking cake sets your mouth to watering, what is the US? The CS? The CR?
- The first step of classical conditioning, when an NS becomes a CS, is called _____________. When a US no longer follows the CS, and the CR becomes weakened, this is called _______________.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Generalization

Pavlov and his students noticed that a dog conditioned to the sound of one tone also responded somewhat to the sound of a new and different tone. Likewise, a dog conditioned to salivate when rubbed would also drool a bit when scratched (Windholz, 1989) or when touched on a different body part (**Figure 26.7**). This tendency to respond to stimuli similar to the CS is called **generalization** (or *stimulus generalization*)**.**

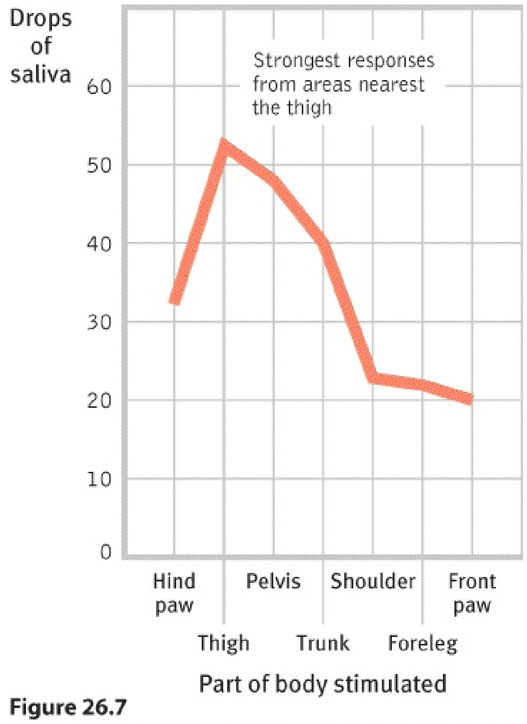

Figure 26.7
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Data from Pavlov, 1927.

Figure 26.7 Generalization

Pavlov demonstrated generalization by attaching miniature vibrators to various parts of a dog's body. After conditioning salivation to stimulation of the thigh, he stimulated other areas. The closer a stimulated spot was to the dog's thigh, the stronger the conditioned response.

generalization

the tendency, once a response has been conditioned, for stimuli similar to the conditioned stimulus to elicit similar responses. (In operant conditioning, generalization occurs when responses learned in one situation occur in other, similar situations.)

Generalization can be adaptive, as when toddlers who learn to fear moving cars also become afraid of moving trucks and motorcycles. And generalized fears can linger. Years after being tortured, one Argentine writer reported still flinching with fear at the sight of black shoes—his first glimpse of his torturers as they approached his cell. Generalized anxiety reactions have been demonstrated in laboratory studies comparing abused with nonabused children (**Figure 26.8**). When an angry face appears on a computer screen, abused children's brain-wave responses are dramatically stronger and longer lasting (Pollak et al., 1998). And when a face that we've been conditioned to like (or dislike) is morphed into another face, we also have some tendency to like (or dislike) the vaguely similar morphed face (Gawronski & Quinn, 2013).

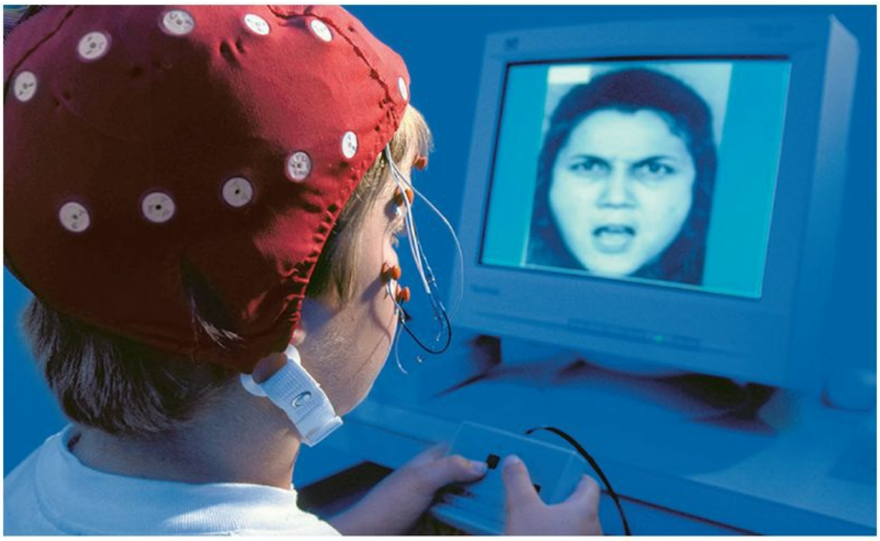


Figure 26.8
© UW-Madison News & Public Affairs, Photo by Jeff Miller

Figure 26.8 Child abuse leaves tracks in the brain

Abused children's sensitized brains react more strongly to angry faces (Pollak et al., 1998). This generalized anxiety response may help explain their greater risk of psychological disorder.

Stimuli similar to naturally disgusting objects will, by association, also evoke some disgust. Shape otherwise desirable fudge to resemble dog feces, and people will be repulsed (Rozin et al., 1986). Ditto when sewage gets recycled as pure drinking water (Rozin et al., 2015). Toilet → tap → yuck. In each of these human examples, people’s emotional reactions to one stimulus have generalized to similar stimuli.

AP® EXAM TIP

Generalization and discrimination are introduced in this module, but they don’t just apply to classical conditioning. These two concepts will show up in other types of learning as well. It is important that you understand this for the AP® exam.

Discrimination

Pavlov’s dogs also learned to respond to the sound of a particular tone and *not* to other tones. One stimulus (tone) predicted the US, and the others did not. This learned ability to *distinguish* between a conditioned stimulus (which predicts the US) and other, irrelevant stimuli is called **discrimination**. Being able to recognize differences is adaptive. Slightly different stimuli can be followed by vastly different consequences. Facing a guard dog, your heart may race; facing a guide dog, it probably will not.

discrimination

in classical conditioning, the learned ability to distinguish between a conditioned stimulus and similar stimuli that do not signal an unconditioned stimulus. (In operant conditioning, the ability to distinguish responses that are reinforced from similar responses that are not reinforced.)

✓ Check Your Understanding

Ask Yourself

- How have your emotions or behaviors been classically conditioned?

Test Yourself

- In horror movies, sexually arousing images of women are sometimes paired with violence against women. Based on classical conditioning principles, what might be an effect of this pairing?

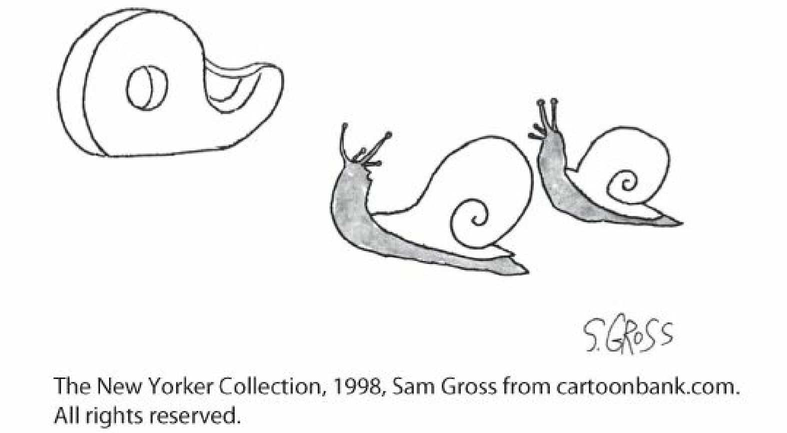
Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Pavlov's Legacy

26-5 Why does Pavlov's work remain so important?

What remains today of Pavlov's ideas? A great deal. Most psychologists now agree that classical conditioning is a basic form of learning. Judged with today's knowledge of the interplay of our biology, psychology, and social-cultural environment, Pavlov's ideas were incomplete. But if we see further than Pavlov did, it is because we stand on his shoulders.

Why does Pavlov's work remain so important? If he had merely taught us that old dogs can learn new tricks, his experiments would long ago have been forgotten. Why should we care that dogs can be conditioned to salivate to the sound of a tone? The importance lies, first, in the finding that *many other responses to many other stimuli can be classically conditioned in many other organisms*—in fact, in every species tested, from earthworms to fish to dogs to monkeys to people (Schwartz, 1984). Thus, classical conditioning is one way that virtually all organisms learn to adapt to their environment.



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“I don’t care if she’s a tape dispenser. I love her.”

What conditioning principle is influencing the snail’s affections?[2]

Second, *Pavlov showed us how a process such as learning can be studied objectively*. He was proud that his methods involved virtually no subjective judgments or guesses about what went on in a dog’s mind. The salivary response is a behavior measurable in cubic centimeters of saliva. Pavlov’s success therefore suggested a scientific model for how the young discipline of psychology might proceed—by isolating the basic building blocks of complex behaviors and studying them with objective laboratory procedures.

Applications of Classical Conditioning

26-6 What have been some applications of Pavlov’s work to human health and well-being? How did Watson apply Pavlov’s principles to learned fears?

Other units in this text show how Pavlov’s principles can influence human health and well-being. Here are three examples:

- *Drug cravings*. Former drug users often feel a craving when they are again in the drug-using context—with people or in places they associate with previous highs. Thus, drug counselors advise their clients to steer clear of people and settings that may trigger these cravings (Siegel, 2005).
- *Food cravings*. Classical conditioning makes dieting difficult. We

readily associate sugary substances with an enjoyable sweet sensation. Researchers have conditioned healthy volunteers to experience cravings after only one instance of eating a sweet food (Blechert et al., 2016). Eating one cookie can create hunger for another. People who struggle with their weight often have eaten unhealthy foods thousands of times, leaving them with strongly conditioned responses to eat the very foods that will keep them in poor health (Hill, 2007).

- *Immune responses.* Classical conditioning even works on the body's disease-fighting immune system. When a particular taste accompanies a drug that influences immune responses, the taste by itself may come to produce an immune response (Ader & Cohen, 1985).

Pavlov's work also provided a basis for Watson's (1913) idea that human emotions and behaviors, though biologically influenced, are mainly a bundle of conditioned responses. Working with an 11-month-old, Watson and his graduate student Rosalie Rayner (1920; Harris, 1979) showed how specific fears might be conditioned. Like most infants, "Little Albert" feared loud noises but not white rats. Watson and Rayner presented a white rat and, as Little Albert reached to touch it, struck a hammer against a steel bar just behind his head. After seven repeats of seeing the rat and hearing the frightening noise, Albert burst into tears at the mere sight of the rat. Five days later, he had generalized this startled fear reaction to the sight of a rabbit, a dog, and a sealskin coat, but not to dissimilar objects, such as toys.

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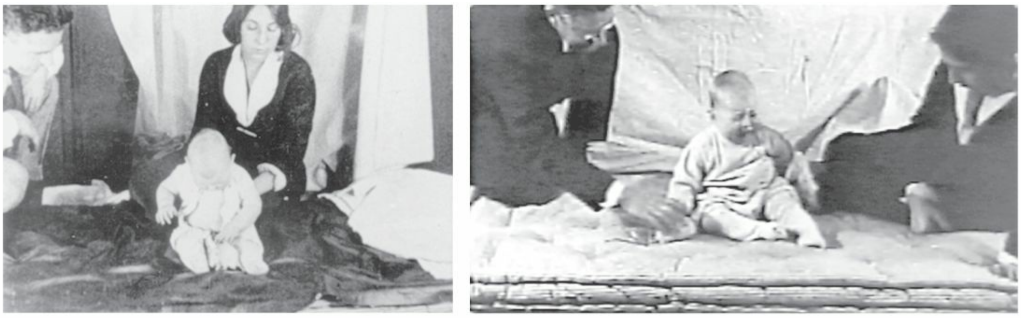
John B. Watson Watson (1924) admitted to "going beyond my facts" when offering his famous boast: "Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief, and, yes, even beggarman and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors."



Archives of the History of American Psychology, The Center for the History of Psychology, The University of Akron

Little Albert In Watson and Rayner's experiments, "Little Albert" learned to fear a white rat after repeatedly experiencing a loud noise as the rat was presented. In these experiments, what was the US? The UR? The NS? The CS? The CR?[3]

For years, people wondered what became of Little Albert. Sleuthing by Russell Powell and his colleagues (2014) found a well-matched child of one of the hospital's wet nurses. The child, William Albert Barger, went by Albert B.—precisely the name used by Watson and Rayner. This Albert, who died in 2007, was an easygoing person, though, perhaps coincidentally, he had an aversion to dogs. He died without ever knowing of his early life in a hospital residence or his role in psychology's history.

People also wondered what became of Watson. After losing his Johns

Hopkins professorship over an affair with Rayner (whom he later married), he joined an advertising agency as the company's resident psychologist. There, he used his knowledge of associative learning to conceive many successful advertising campaigns, including one for Maxwell House that helped make the "coffee break" an American custom (Hunt, 1993).

The treatment of Little Albert would be unethical by today's standards. Also, some psychologists had difficulty repeating Watson and Rayner's findings with other children. Nevertheless, Little Albert's learned fears led many psychologists to wonder whether each of us might be a walking warehouse of conditioned emotions. If so, might extinction procedures or new conditioning help us change our unwanted responses to emotion-arousing stimuli?

One patient, who for 30 years had feared entering an elevator alone, did just that. Following his therapist's advice, he forced himself to enter 20 elevators a day. Within 10 days, his fear had nearly vanished (Ellis & Becker, 1982). With support from airline AirTran, comedian-writer Mark Malkoff likewise extinguished his fear of flying. He lived on an airplane for 30 days, taking 135 flights that had him in the air 14 hours a day (NPR, 2009). After a week and a half, his fears had faded and he began playing games with fellow passengers. (His favorite antic was the "toilet paper experiment": He'd put one end of a roll in the toilet, unroll the rest down the aisle, and flush. The entire roll would be sucked down in three seconds.) In Unit XIII we will see more examples of how psychologists use behavioral techniques such as *counterconditioning* to treat emotional disorders and promote personal growth.

Module 26 REVIEW

26-1 How do we define *learning*, and what are some basic forms of learning?

- *Learning* is the process of acquiring through experience new and relatively enduring information or behaviors.
- In *associative learning*, we learn that certain events occur together.
- In classical conditioning, we learn to associate two or more stimuli (a *stimulus* is any event or situation that evokes a response). Automatically responding to stimuli we do not control is called *respondent behavior*.
- In operant conditioning, we learn to associate a response and its consequences. These associations produce *operant behaviors*.
- Through *cognitive learning*, we acquire mental information that guides our behavior. For example, in observational learning, we learn new behaviors by observing events and watching others.

26-2 What is behaviorism's view of learning?

- Ivan Pavlov's work on classical conditioning laid the foundation for *behaviorism*, the view that psychology should be an objective science that studies behavior without reference to mental processes. The behaviorists believed that the basic laws of learning are the same for all species, including humans.

26-3 Who was Pavlov, and what are the basic components of classical conditioning?

- Ivan Pavlov, a Russian physiologist, created novel experiments on learning. His early twentieth-century research over the last three decades of his life demonstrated that classical conditioning is a basic form of learning.

- *Classical conditioning* is a type of learning in which an organism comes to associate stimuli and anticipate events. The process involves stimuli and responses:
    - A *UR* is an event that occurs naturally (such as salivation), in response to some stimulus.
    - A *US* is something that naturally and automatically (without learning) triggers the unlearned response (as food in the mouth triggers salivation).
    - A *CS* is originally an *NS* (neutral stimulus, such as a tone) that, after association with a US (such as food) comes to trigger a CR.
    - A *CR* is the learned response (salivating) to the originally neutral (but now conditioned) stimulus.

26-4 In classical conditioning, what are the processes of *acquisition, extinction, spontaneous recovery, generalization,* and *discrimination?*

- In classical conditioning, the first stage is *acquisition,* or associating an NS with the US so that the NS begins triggering the CR.
- Acquisition occurs most readily when the NS is presented just before (ideally, about a half-second before) a US, preparing the organism for the upcoming event. This finding supports the view that classical conditioning is biologically adaptive. Through *higher-order conditioning,* a new NS can become a new CS.
- *Extinction* is diminished responding, which occurs if the CS appears repeatedly by itself (without the US).
- *Spontaneous recovery* is the appearance of a formerly extinguished response, following a rest period.
- *Generalization* is the tendency to respond to stimuli that are similar to a CS.
- *Discrimination* is the learned ability to distinguish between a CS and other irrelevant stimuli.

26-5 Why does Pavlov's work remain so important?

- Pavlov taught us that significant psychological phenomena can be studied objectively, and that classical conditioning is a basic form of learning that applies to all species.

26-6 What have been some applications of Pavlov's work to human health and well-being? How did Watson apply Pavlov's principles to learned fears?

- Classical conditioning techniques are used to improve human health and well-being in many areas, including therapy for those recovering from drug addiction and for some types of psychological disorders. The body's immune system may also respond to classical conditioning.
- Pavlov's work also provided a basis for Watson's idea that human emotions and behaviors, though biologically influenced, are mainly a bundle of conditioned responses. Watson applied classical conditioning principles in his studies of "Little Albert" to demonstrate how specific fears might be conditioned.

Multiple-Choice Questions

1. Which of the following is the best example of learning?

a. A dog salivates when food is placed in its mouth.
b. A honeybee stings when the hive is threatened.
c. A child cries when his brother hits him.
d. A child feels ill after drinking sour milk.
e. A child flinches when he sees lightning because he is afraid of thunder.

2. A family uses the microwave to prepare their cat's food. The cat comes running into the room when the microwave timer sounds, but not when it hears the oven timer. The cat is demonstrating the concept of

a. generalization.

b. discrimination.
c. spontaneous recovery.
d. extinction.
e. habituation.

3. In classical conditioning, a person learns to anticipate events by

a. associating a response with its consequence.
b. avoiding spontaneous recovery.
c. using operant behaviors.
d. associating two stimuli.
e. employing cognitive learning.

4. In classical conditioning, the conditioned stimulus

a. naturally triggers a response.
b. is a naturally occurring response.
c. is initially neutral, and then comes to trigger a response.
d. prompts spontaneous recovery.
e. is a reward offered for completing a behavior.

5. Students are accustomed to a bell ringing to indicate the end of a class period. The principal decides to substitute popular music for the bell to indicate the end of each class period. Students quickly respond to the music in the same way they did to the bell. In this example, the music is a(n)

a. conditioned response.
b. conditioned stimulus.
c. unconditioned response.
d. unconditioned stimulus.
e. habituated response.

6. Students in a school are accustomed to moving to the next class when music plays. After a period of time, the principal replaces the music with a bell to signal the end of class. If one day he plays the music by mistake and the students leave class, which of the following is being shown?

a. Acquisition
b. Generalization
c. Habituation
d. Spontaneous recovery
e. Operant conditioning

Practice FRQs

1. Carter’s romantic friend has worn plaid shirts on all their special dates. Now, when seeing a plaid shirt, Carter automatically feels happy and a little excited. Identify what each of the following terms would be in this example.

- Conditioned response (CR)
- Conditioned stimulus (CS)
- Unconditioned stimulus (US)

Answer

1 point: The happy, excited response to the plaid shirt is the CR (thanks to its learned association with the plaid-wearing friend in happy times). Page 274

1 point: The plaid shirt was initially a neutral stimulus (NS). But, thanks to its association with the friend in the dating situation, it has become a CS. Page 274

1 point: The friend in a romantic context is the US. Page 274

2. A researcher paired the sound of a whistle with a puff of air to the eye to classically condition Ashley to blink when the whistle alone was sounded. Explain how the researcher could demonstrate the following.

- Generalization
- Extinction
- Spontaneous recovery

(3 points)

Module **27 Operant Conditioning**

LEARNING TARGETS

- 27-1 Describe *operant conditioning.*
- 27-2 Identify Skinner, and describe how operant behavior is reinforced and shaped.
- 27-3 Differentiate positive reinforcement from negative reinforcement, and identify the basic types of reinforcers.
- 27-4 Explain how different reinforcement schedules affect behavior.
- 27-5 Differentiate punishment from negative reinforcement, and explain how punishment affects behavior.
- 27-6 Describe why Skinner's ideas provoked controversy.

27-1 What is *operant conditioning?*

It's one thing to classically condition a dog to salivate to the sound of a tone, or a child to fear moving cars. But to teach an elephant to walk on its hind legs or a child to say *please*, we turn to operant conditioning.

Classical conditioning and operant conditioning are both forms of associative learning, yet their differences are straightforward:

- *Classical conditioning* forms associations between stimuli (a CS and the US it signals). It also involves *respondent behavior*—automatic responses to a stimulus (such as salivating in response to meat powder and later in response to a tone).

- In **operant conditioning**, organisms associate their own actions with consequences. Actions followed by reinforcers increase; those followed by punishments often decrease. Behavior that *operates* on the environment to produce rewarding or punishing stimuli is called *operant behavior*.

operant conditioning

a type of learning in which a behavior becomes more likely to recur if followed by a reinforcer or less likely to recur if followed by a punisher.

✓ Check Your Understanding

Ask Yourself

- Consider what you have learned so far about these two types of associative learning. Why does operant conditioning help teach a child good manners?

Test Yourself

- With classical conditioning, we learn associations between events we __________ (do/do not) control. With operant conditioning, we learn associations between our behavior and __________ (resulting/random) events.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Skinner’s Experiments

27-2 Who was Skinner, and how is operant behavior reinforced and shaped?

B. F. Skinner (1904–1990) was a college English major and aspiring writer who, seeking a new direction, enrolled as a graduate student in psychology. He went on to become modern behaviorism’s most influential and controversial figure. Skinner’s work elaborated on what psychologist Edward L. Thorndike (1874–1949) called the **law of effect:** Rewarded behavior tends to recur (**Figure 27.1**), and punished behavior is less likely to recur. Using Thorndike’s law of effect as a starting point, Skinner developed a behavioral technology that revealed principles of *behavior control*. By shaping pigeons’ natural walking and pecking behaviors, for example, Skinner was able to teach them such unpigeon-like behaviors as walking in a figure 8, playing Ping-Pong, and keeping a missile on course by pecking at a screen target.

law of effect

Thorndike’s principle that behaviors followed by favorable consequences become more likely, and that behaviors followed by unfavorable consequences become less likely.

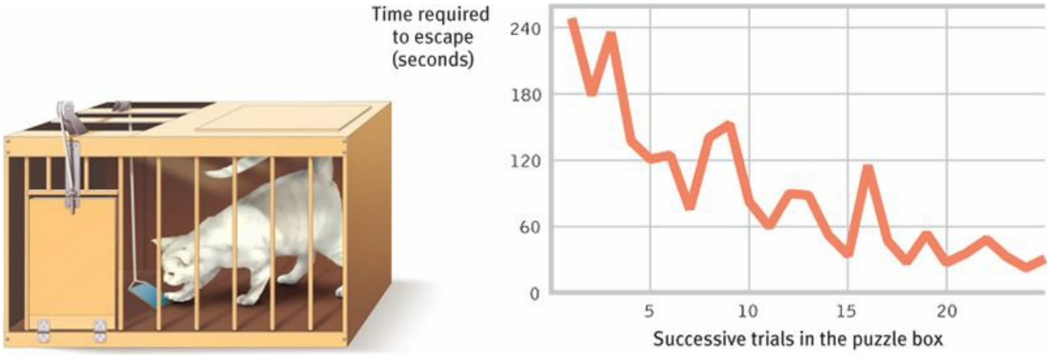


Figure 27.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Thorndike, 1898.

Figure 27.1 **Cat in a puzzle box**

Thorndike used a fish reward to entice cats to find their way out of a puzzle box through a series of maneuvers. The cats' performance tended to improve with successive trials, illustrating Thorndike's *law of effect.*

For his pioneering studies, Skinner designed an **operant chamber**, popularly known as a *Skinner box* (**Figure 27.2**). The box has a bar (a lever) that an animal presses—or a key (a disc) the animal pecks—to release a reward of food or water. It also has a device that records these responses. This creates a stage on which rats and other animals act out Skinner's concept of **reinforcement**: any event that strengthens (increases the frequency of) a preceding response. What is reinforcing depends on the animal and the conditions. For people, it may be praise, attention, or a paycheck. For hungry and thirsty rats, food and water work well. Skinner's experiments have done far more than teach us how to pull habits out of a rat. They have explored the precise conditions that foster efficient and enduring learning.

operant chamber

in operant conditioning research, a chamber (also known as a Skinner box) containing a bar or key that an animal can manipulate to obtain a food or water reinforcer; attached devices record the animal's rate of bar pressing or key pecking.

reinforcement

in operant conditioning, any event that *strengthens* the behavior it follows.

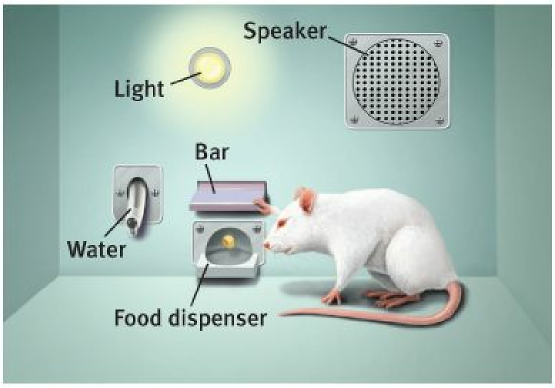


Figure 27.2
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Figure 27.2 A Skinner box

Inside the box, the rat presses a bar for a food reward. Outside, measuring devices (not shown here) record the animal's accumulated responses.

Shaping Behavior

Imagine that you wanted to condition a hungry rat to press a bar. Like Skinner, you could tease out this action with **shaping**, gradually guiding the rat's actions toward the desired behavior. First, you would watch how the animal naturally behaves, so that you could build on its existing behaviors. You might give the rat a bit of food each time it approaches the bar. Once the rat is approaching regularly, you would give the food only when it moves close to the bar, then closer still. Finally, you would require it to touch the bar to get food. By rewarding *successive approximations* (as Sutherland did with her husband), you reinforce responses that are ever closer to the final desired behavior, and you ignore all other responses. By making rewards contingent on desired behaviors, researchers and animal trainers gradually shape complex behaviors.

shaping

an operant conditioning procedure in which reinforcers guide behavior toward closer and closer approximations of the desired behavior.

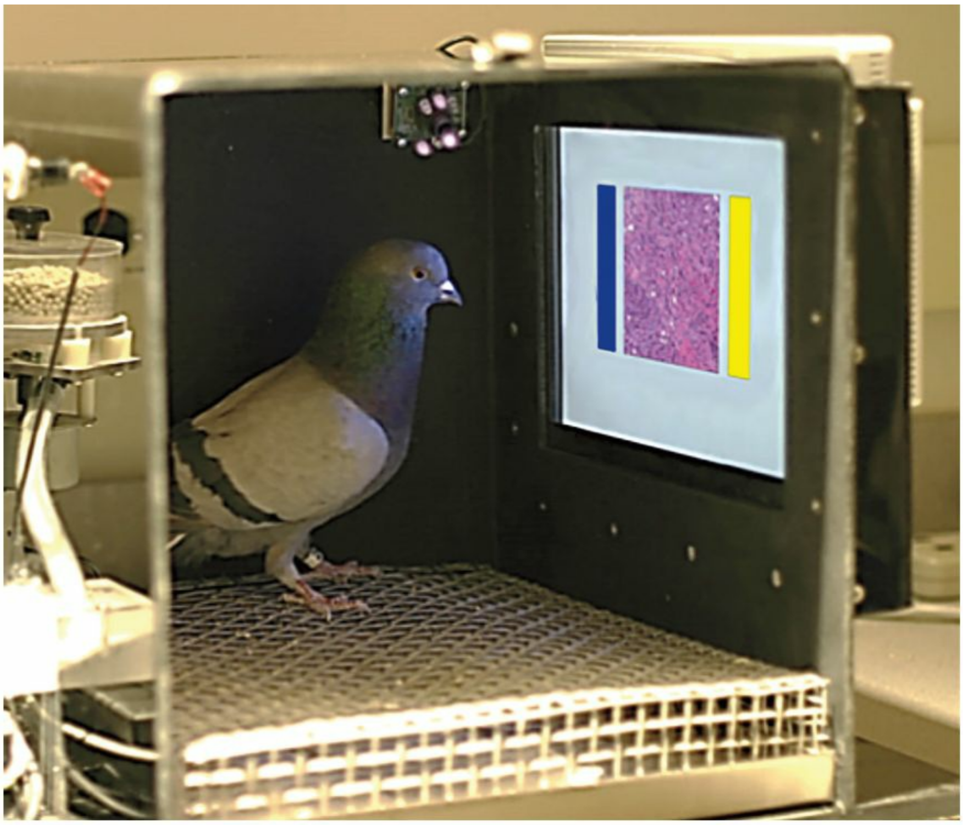
Will Burgess/Reuters/Newscom

Reinforcers vary with circumstances What is reinforcing (a heat lamp) to one animal (a cold meerkat) may not be to another (an overheated child). What is reinforcing in one situation (a cold snap at the Taronga Zoo in Sydney, Australia) may not be in another (a sweltering summer day).

Shaping can also help us understand what nonverbal organisms can perceive. Can a dog distinguish red and green? Can a baby hear the difference between lower- and higher-pitched tones? If we can shape them to respond to one stimulus and not to another, then we know they can perceive the difference. Such experiments have even shown that some nonhuman animals can form concepts. When experimenters reinforced pigeons for pecking after seeing a human face, but not after seeing other images, the pigeon's behavior showed that it could recognize human faces (Herrnstein & Loveland, 1964). In this experiment, the human face was a **discriminative stimulus**. Like a green traffic light, discriminative stimuli signal that a response will be reinforced (**Figure 27.3**). After being trained to discriminate among classes of events or objects—flowers, people, cars, chairs—pigeons can usually identify the category in which a new pictured object belongs (Bhatt et al., 1988; Wasserman, 1993). They have even been trained to discriminate between the music of Bach and Stravinsky (Porter & Neuringer, 1984).

discriminative stimulus

in operant conditioning, a stimulus that elicits a response after association with reinforcement (in contrast to related stimuli not associated with reinforcement).



Levenson RM, Krupinski EA, Navarro VM, Wasserman EA (2015). Pigeons (Columba livia) as Trainable Observers of Pathology and Radiology Breast Cancer Images. *PLoS ONE 10*(11): e0141357.

Figure 27.3 Bird brains spot tumors

After being rewarded with food when correctly spotting breast tumors, pigeons became as skilled as humans at discriminating cancerous from healthy tissue (Levenson et al., 2015). Other animals have been shaped to sniff out land mines or locate people amid rubble (La Londe et al., 2015).

Skinner noted that we continually reinforce and shape others’ everyday behaviors, though we may not mean to do so. Isaac’s whining annoys his dad, for example, but consider how his dad typically responds:

Isaac: Could you take me to the mall?

Dad: (Continues reading paper.)

Isaac: Dad, I need to go to the mall.

Dad: Uh, yeah, in a few minutes.

Isaac: DAAAAD! The mall!!

Dad: Show me some manners! Okay, where are my keys . . .

Isaac’s whining is reinforced, because he gets something desirable—a trip to the mall. Dad’s response is reinforced, because it gets rid of something aversive—Isaac’s whining.

Or consider a teacher who sticks gold stars on a wall chart beside the names of children scoring 100 percent on spelling tests. As everyone can then see, some children consistently do perfect work. The others, who may have worked harder than the academic all-stars, get no rewards. The teacher would be better advised to apply the principles of operant conditioning—to reinforce all spellers for gradual improvements (successive approximations toward perfect spelling of words they find challenging).

Types of Reinforcers

Flip It Video: Reinforcement

27-3 How do positive and negative reinforcement differ, and what are the basic types of reinforcers?

Until now, we’ve mainly been discussing **positive reinforcement**, which strengthens responding by *presenting* a typically *pleasurable* stimulus immediately after a response. But, as the whining Isaac story illustrates, there are *two* basic kinds of reinforcement (**Table 27.1**). **Negative reinforcement** strengthens a response by *reducing or removing* something *negative*. Isaac’s whining was *positively* reinforced, because Isaac got something desirable—a trip to the mall. His dad’s response (doing what Isaac wanted) was *negatively* reinforced, because it ended an aversive event—Isaac’s whining. Similarly, taking aspirin may relieve your headache, and hitting *snooze* will silence your irritating alarm. These welcome results provide negative reinforcement and increase the odds that you will repeat these behaviors. For those with drug addiction, the negative reinforcement of ending withdrawal pangs can be a compelling reason to resume using (Baker et al., 2004). Note that *negative reinforcement is not punishment.* (Some friendly advice: Repeat those italicized words in your mind.) Rather, negative reinforcement—psychology's most misunderstood concept—*removes* a punishing (aversive) event. Think of negative reinforcement as something that provides relief—from that whining teenager, bad headache, or annoying seat belt alarm.

positive reinforcement

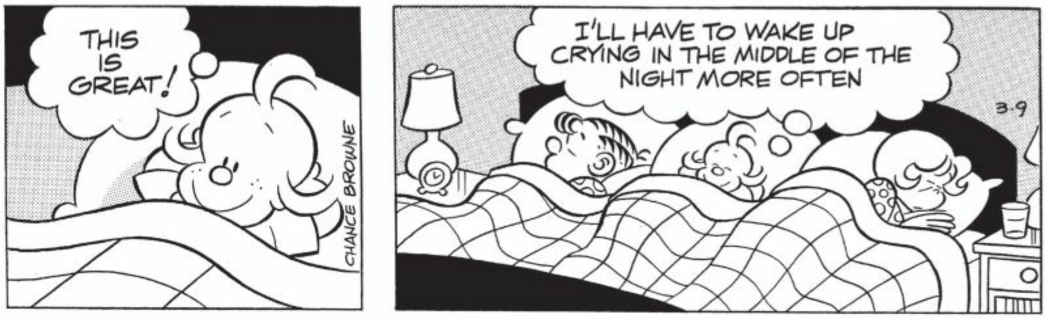
increasing behaviors by presenting positive reinforcers. A positive reinforcer is any stimulus that, when *presented* after a response, strengthens the response.

negative reinforcement

increasing behaviors by stopping or reducing aversive stimuli. A negative reinforcer is any stimulus that, when *removed* after a response, strengthens the response. (*Note*: Negative reinforcement is not punishment.)

TABLE 27.1 Ways to Increase Behavior

Operant Conditioning Term	Description	Examples
Positive reinforcement	Add a desirable stimulus.	Pet a dog that comes when you call it; pay someone for work done.
Negative reinforcement	Remove an aversive stimulus.	Take painkillers to end pain; fasten seat belt to end loud beeping.


THIS IS GREAT!
CHANCE BROWNE
I'LL HAVE TO WAKE UP CRYING IN THE MIDDLE OF THE NIGHT MORE OFTEN
3-9

Hi & LOIS © 1992 by King Features Syndicate, Inc. World rights reserved.

Crying works How is operant conditioning at work in this cartoon?[1]

AP® EXAM TIP

Prepare to identify specific examples of positive and negative reinforcements. Pay particular attention to Table 27.1 for guidance.

Sometimes negative and positive reinforcement coincide. Imagine a worried student who, after goofing off and getting a bad test grade, studies harder for the next test. This increased effort may be *negatively* reinforced by reduced anxiety, and *positively* reinforced by a better grade. We reap the rewards of escaping the aversive stimulus, which increases the chances that we will repeat our behavior. *The point to remember:* Whether it works by reducing something aversive or by providing something desirable, *reinforcement is any consequence that strengthens behavior.*

Primary and Conditioned Reinforcers

Getting food when hungry or having a painful headache go away is innately satisfying. These **primary reinforcers** are unlearned. **Conditioned reinforcers**, also called *secondary reinforcers*, get their power through learned association with primary reinforcers. If a rat in a Skinner box learns that a light reliably signals a food delivery, the rat will work to turn on the light (see Figure 27.2). The light has become a conditioned reinforcer. Our lives are filled with conditioned reinforcers—money, good grades, a pleasant tone of voice—each of which has been linked with more basic rewards. If money is a conditioned reinforcer—if people's desire for money is derived from their desire for food—then hunger should also make people more money hungry, reasoned one European research team (Briers et al., 2006). Indeed, in their experiments, people were less likely to donate to charity when food deprived, and less likely to share money with fellow participants when in a room with hunger-arousing aromas.

primary reinforcer

an innately reinforcing stimulus, such as one that satisfies a biological need.

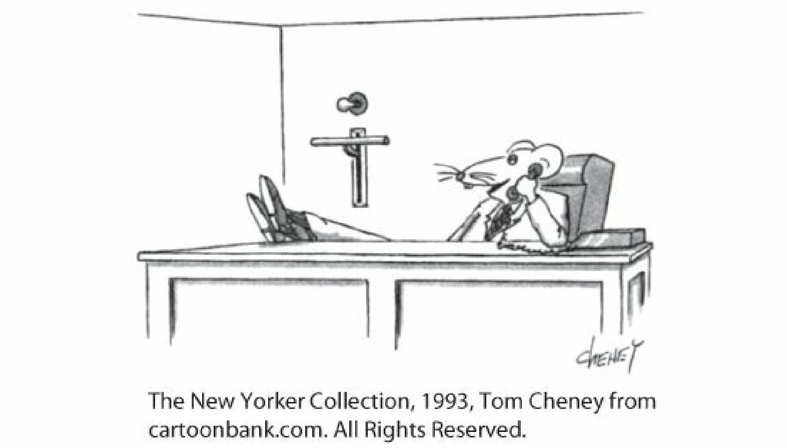
conditioned reinforcer

a stimulus that gains its reinforcing power through its association with a primary reinforcer; also known as a *secondary reinforcer*.

Immediate and Delayed Reinforcers

Let's return to the imaginary shaping experiment in which you were conditioning a rat to press a bar. Before performing this "wanted" behavior, the hungry rat will engage in a sequence of "unwanted" behaviors—scratching, sniffing, and moving around. If you present food immediately after any one of these behaviors, the rat will likely repeat that rewarded behavior. But what if the rat presses the bar while you are distracted, and you delay giving the reinforcer? If the delay lasts longer than about 30 seconds, the rat will not learn to press the bar. It will have moved on to other incidental behaviors, such as scratching, sniffing, and moving, and one of these behaviors will instead get reinforced.

Unlike rats, humans do respond to delayed reinforcers: the paycheck at the end of the week, the good grade at the end of the term, the trophy at the end of the sports season. Indeed, to function effectively we must learn to delay gratification. In one of psychology's most famous studies, some 4-year-olds showed this ability. In choosing a piece of candy or a marshmallow, these impulse-controlled children preferred having a big one tomorrow to munching on a small one right away. Learning to control our impulses in order to achieve more valued rewards is a big step toward maturity and can later protect us from committing an impulsive crime (Åkerlund et al., 2016; Logue, 1998a,b). Children who delay gratification have tended to become socially competent and high-achieving adults (Mischel, 2014).



The New Yorker Collection, 1993, Tom Cheney from cartoonbank.com. All Rights Reserved.

"Oh, not bad. The light comes on, I press the bar, they write me a check. How about you?"

To our detriment, small but immediate pleasures (the enjoyment of watching late-night TV, for example) are sometimes more alluring than big but delayed rewards (feeling rested for a big test tomorrow). For many teens, the immediate gratification of risky, unprotected sex in passionate moments prevails over the delayed gratifications of safe sex or saved sex. And for many people, the immediate rewards of gas-guzzling vehicles, air travel, and air conditioning prevail over the bigger future consequences of global climate change, rising seas, and extreme weather.

Reinforcement Schedules

27-4 How do different reinforcement schedules affect behavior?

In most of our examples, the desired response has been reinforced every time it occurs. But **reinforcement schedules** vary. With **continuous reinforcement**, learning occurs rapidly, which makes it the best choice for mastering a behavior. But extinction also occurs rapidly. When reinforcement stops—when we stop delivering food after the rat presses the bar—the behavior soon stops (is *extinguished*). If a normally dependable candy machine fails to deliver a chocolate bar twice in a row, we stop putting money into it (although a week later we may exhibit *spontaneous recovery* by trying again).

reinforcement schedule

a pattern that defines how often a desired response will be reinforced.

continuous reinforcement schedule

reinforcing the desired response every time it occurs.

Real life rarely provides continuous reinforcement. Salespeople do not make a sale with every pitch. But they persist because their efforts are occasionally rewarded. This persistence is typical with **partial (intermittent) reinforcement schedules**, in which responses are sometimes reinforced, sometimes not. Learning is slower to appear, but *resistance to extinction* is greater than with continuous reinforcement. Imagine a pigeon that has learned to peck a key to obtain food. If you gradually phase out the food delivery until it occurs only rarely, in no predictable pattern, the pigeon may peck 150,000 times without a reward (Skinner, 1953). Slot machines reward gamblers in much the same way—occasionally and unpredictably. And like pigeons, slot players keep trying, time and time again. With intermittent reinforcement, hope springs eternal.

partial (intermittent) reinforcement schedule

reinforcing a response only part of the time; results in slower acquisition of a response but much greater resistance to extinction than does continuous reinforcement.

Lesson for parents and babysitters: Partial reinforcement also works with children. *Occasionally* giving in to children’s tantrums for the sake of peace and quiet intermittently reinforces the tantrums. This is the very best procedure for making a behavior persist.

Skinner (1961) and his collaborators compared four schedules of partial reinforcement. Some are rigidly fixed, some unpredictably variable.

Fixed-ratio schedules reinforce behavior after a set number of responses. Coffee shops may reward us with a free drink after every 10 purchased. Once conditioned, rats may be reinforced on a fixed ratio of, say, one food pellet for every 30 responses. Once conditioned, animals will pause only briefly after a reinforcer before returning to a high rate of responding (**Figure 27.4**).

fixed-ratio schedule

in operant conditioning, a reinforcement schedule that reinforces a response only after a specified number of responses.

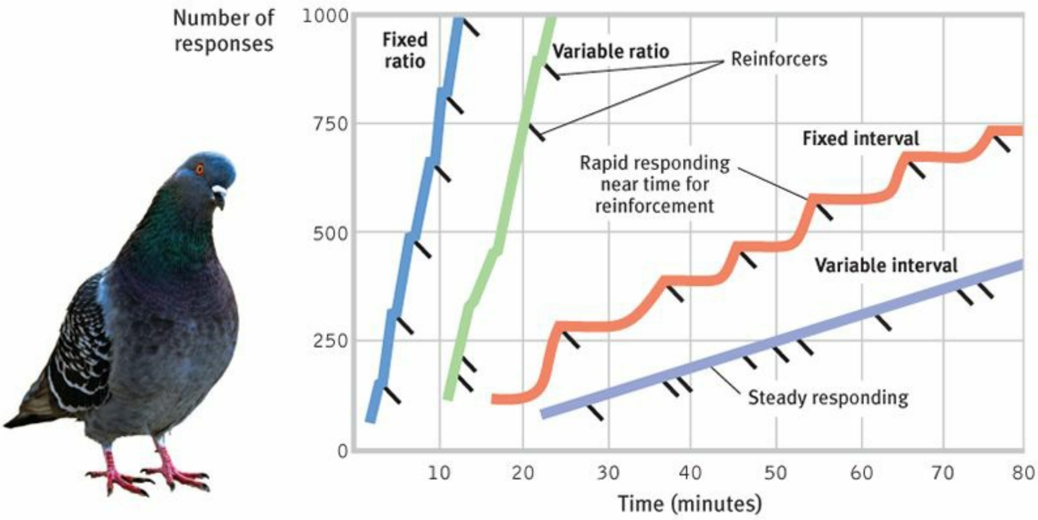


Figure 27.4
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Left Image: Vitaly Titov/Shutterstock; Right Image: Data from Skinner, 1961.

Figure 27.4 Intermittent reinforcement schedules

Skinner's (1961) laboratory pigeons produced these response patterns to each of four reinforcement schedules. (Reinforcers are indicated by diagonal marks.) For people, as for pigeons, reinforcement linked to number of responses (a *ratio schedule*) produces a higher response rate than reinforcement linked to amount of time elapsed (an *interval schedule*). But the predictability of the reward also matters. An unpredictable *(variable)* schedule produces more consistent responding than does a predictable *(fixed)* schedule.

Variable-ratio schedules provide reinforcers after a seemingly unpredictable number of responses. This unpredictable reinforcement is what slot-machine players and fly fishers experience, and it's what makes gambling and fly fishing so hard to extinguish even when they don't produce the desired results. Because reinforcers increase as the number of responses increases, variable-ratio schedules produce high rates of responding.

variable-ratio schedule

in operant conditioning, a reinforcement schedule that reinforces a response after an unpredictable number of responses.

Fixed-interval schedules reinforce the first response after a fixed time period. Animals on this type of schedule tend to respond more frequently as the anticipated time for reward draws near. People check more frequently for the mail as the delivery time approaches. Pigeons peck keys more rapidly as the time for reinforcement draws nearer. This produces a choppy stop-start pattern rather than a steady rate of response (see Figure 27.4).

fixed-interval schedule

in operant conditioning, a reinforcement schedule that reinforces a response only after a specified time has elapsed.

Variable-interval schedules reinforce the first response after *varying* time intervals. At unpredictable times, a food pellet rewarded Skinner's pigeons for persistence in pecking a key. Like the longed-for message that finally rewards persistence in checking our phone, variable-interval schedules tend to produce slow, steady responding. This makes sense, because there is no knowing when the waiting will be over (Table 27.2).

variable-interval schedule

in operant conditioning, a reinforcement schedule that reinforces a response at unpredictable time intervals.

TABLE 27.2 Schedules of Partial Reinforcement

	Fixed	**Variable**
Ratio	*Every so many:* reinforcement after every *nth* behavior, such as buy 10 coffees, get 1 free, or pay workers per product unit produced	*After an unpredictable number:* reinforcement after a random number of behaviors, as when playing slot machines or fly fishing
Interval	*Every so often:* reinforcement for behavior after a fixed time, such as Tuesday discount prices	*Unpredictably often:* reinforcement for behavior after a random amount of time, as when studying for an unpredictable pop quiz

AP® EXAM TIP

Students sometimes have difficulty with the schedules of reinforcement. The word *interval* in schedules of reinforcement means that an interval of time must pass before reinforcement. There is nothing the learner can do to shorten the interval. The word *ratio* refers to the ratio of responses to reinforcements. If the learner responds with greater frequency, there will be more reinforcements.

In general, response rates are higher when reinforcement is linked to the number of responses (a ratio schedule) rather than to time (an interval schedule). But responding is more consistent when reinforcement is unpredictable (a variable schedule) than when it is predictable (a fixed schedule). Animal behaviors differ, yet Skinner (1956) contended that the reinforcement principles of operant conditioning are universal. It matters little, he said, what response, what reinforcer, or what species you use. The effect of a given reinforcement schedule is pretty much the same: "Pigeon, rat, monkey, which is which? It doesn't matter. . . . Behavior shows astonishingly similar properties."

> "*The charm of fishing is that it is the pursuit of what is elusive but attainable, a perpetual series of occasions for hope.*"
>
> *Scottish author John Buchan (1875–1940)*

✓ Check Your Understanding

Ask Yourself

- In your everyday life, what type of reinforcement schedule do you respond to most strongly?

Test Yourself

- People who send spam e-mail are reinforced by which schedule? Home bakers checking the oven to see if the cookies are done are on which schedule? Sandwich shops that offer a free sandwich after every 10 sandwiches purchased are using which reinforcement schedule?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Punishment

27-5 How does punishment differ from negative reinforcement, and how does punishment affect behavior?

Reinforcement increases a behavior; **punishment** does the opposite. So, while negative reinforcement *increases* the frequency of a preceding behavior (by withdrawing something negative), a *punisher* is any consequence that *decreases* the frequency of a preceding behavior (**Table 27.3**). Swift and sure punishers can powerfully restrain unwanted behavior. The rat that is shocked after touching a forbidden object and the child who is burned by touching a hot stove will learn not to repeat those behaviors.

punishment

an event that tends to *decrease* the behavior that it follows.

TABLE 27.3 Ways to Decrease Behavior

Type of Punisher	Description	Examples
Positive punishment	Administer an aversive stimulus.	Spray water on a barking dog; give a traffic ticket for speeding.
Negative punishment	Withdraw a rewarding stimulus.	Take away a misbehaving teen's driving privileges; revoke a rude person's chat room access.

Criminal behavior, much of it impulsive, is also influenced more by swift and sure punishers than by the threat of severe sentences (Darley & Alter, 2013). Thus, when Arizona introduced an exceptionally harsh sentence for first-time drunk drivers, the drunk-driving rate changed very little. But when Kansas City police started patrolling a high crime area to increase the swiftness and sureness of punishment, that city's crime rate dropped dramatically.

AP® EXAM TIP

You must be able to differentiate between reinforcement and punishment. Remember that *any kind of reinforcement* (positive, negative, primary, conditioned, immediate, delayed, continuous, or partial) encourages the behavior. *Any kind of punishment* discourages the behavior. Positive and negative do not refer to values—it’s not that positive reinforcement (or punishment) is the good kind and negative is the bad. Think of positive and negative mathematically; a stimulus is added with positive reinforcement (or punishment) and a stimulus is subtracted with negative reinforcement (or punishment).

What do punishment studies imply for parenting? One analysis of over 160,000 children found that physical punishment rarely corrects unwanted behavior (Gershoff & Grogan-Kaylor, 2016). Many psychologists note four major drawbacks of physical punishment (Finkenauer et al., 2015; Gershoff, 2002; Marshall, 2002).

1. *Punished behavior is suppressed, not forgotten. This temporary state may (negatively) reinforce parents’ punishing behavior.* The child swears, the parent swats, the parent hears no more swearing and feels the punishment successfully stopped the behavior. No wonder spanking is a hit with so many parents—with 60 percent of children around the world spanked or otherwise physically punished (UNICEF, 2014).
2. *Punishment teaches discrimination among situations.* In operant conditioning, *discrimination* occurs when an organism learns that certain responses, but not others, will be reinforced. Did the punishment effectively end the child’s swearing? Or did the child simply learn that while it’s not okay to swear around the house, it’s okay elsewhere?
3. *Punishment can teach fear.* In operant conditioning, *generalization* occurs when an organism’s response to similar stimuli is also reinforced. A punished child may associate fear not only with the undesirable behavior but also with the person who delivered the punishment or where it occurred. Thus, children may learn to fear a punishing teacher and try to avoid school, or may become more anxious (Gershoff et al., 2010). For such reasons, most European

countries and 31 U.S. states now ban hitting children in schools and child-care institutions (EndCorporalPunishment.org). As of 2017, 51 countries outlaw hitting by parents. A large survey in Finland, the second country to pass such a law, revealed that children born after the law passed were, indeed, less often slapped and beaten (Österman et al., 2014).

4. *Physical punishment may increase aggression by modeling violence as a way to cope with problems.* Studies find that spanked children are at increased risk for aggression (MacKenzie et al., 2013). We know, for example, that many aggressive delinquents and abusive parents come from abusive families (Straus & Gelles, 1980; Straus et al., 1997).

Some researchers question this logic. Physically punished children may be more aggressive, they say, for the same reason that people who have undergone psychotherapy are more likely to suffer depression—because they had preexisting problems that triggered the treatments (Ferguson, 2013; Larzelere, 2000; Larzelere et al., 2004). So, does spanking cause misbehavior, or does misbehavior trigger spanking? Correlations don't hand us an answer.

The debate continues. Some researchers note that frequent spankings predict future aggression—even when studies control for preexisting bad behavior (Taylor et al., 2010). Other researchers believe that lighter spankings pose less of a problem (Baumrind et al., 2002; Larzelere & Kuhn, 2005). That is especially so if physical punishment is used only as a backup for milder disciplinary tactics, and if it is combined with a generous dose of reasoning and reinforcing.

Parents of delinquent youths are often unaware of how to achieve desirable behaviors without screaming at, hitting, or threatening their children with punishment (Patterson et al., 1982). Training programs can help transform dire threats ("Apologize right now or I'm taking that cell phone away!") into positive incentives ("You're welcome to have your phone back when you apologize."). Stop and think about it. Aren't many threats of punishment just as forceful, and perhaps more effective, when rephrased positively? Thus, "If you don't get your homework done, I'm not giving you money for a movie!” could be phrased more positively as. . . .

In classrooms, too, teachers can give feedback by saying, “No, but try this . . .” and “Yes, that’s it!” Such responses reduce unwanted behavior while reinforcing more desirable alternatives. Remember: *Punishment tells you what not to do; reinforcement tells you what to do.* Thus, punishment trains a particular sort of morality—one focused on prohibition (what *not* to do) rather than positive obligations (Sheikh & Janoff-Bulman, 2013).

> “*A pat on the back, though only a few vertebrae removed from a kick in the pants, is miles ahead in results.*”
>
> *Attributed to publisher Bennett Cerf (1898–1971)*

What punishment often teaches, said Skinner, is how to avoid it. Most psychologists now favor an emphasis on reinforcement: *Notice people doing something right and affirm them for it.*

✓ Check Your Understanding

Ask Yourself

- Have you witnessed punishment that was effective? That was ineffective? Do you understand why there was a difference?

Test Yourself

- Fill in the three blanks on the right with one of the following terms: positive reinforcement (PR), negative reinforcement (NR), positive punishment (PP), and negative punishment (NP). We have provided the first answer (PR) for you.

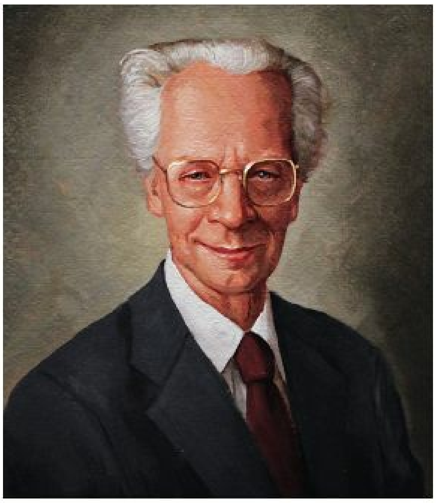
Type of Stimulus	**Give It**	**Take It Away**
Desired (for example, a teen’s use of the car):	1. PR	2.
Undesired/aversive (for example, an insult):	3.	4.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Skinner’s Legacy

27-6 Why did Skinner’s ideas provoke controversy?

B. F. Skinner stirred a hornet’s nest with his outspoken beliefs. He repeatedly insisted that external influences, not internal thoughts and feelings, shape behavior. He argued that brain science isn’t needed for psychological science, saying that “a science of behavior is independent of neurology” (Skinner, 1938/1966, pp. 423–424). And he urged people to use operant conditioning principles to influence others’ behavior at school, work, and home. Knowing that behavior is shaped by its results, he argued that we should use rewards to evoke more desirable behavior.



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B. F. Skinner “I am sometimes asked, ‘Do you think of yourself as you think of the organisms you study?’ The answer is yes. So far as I know, my behavior at any given moment has been nothing more than the product of my genetic endowment, my personal history, and the current setting” (1983).

Skinner’s critics objected, saying that he dehumanized people by neglecting their personal freedom and by seeking to control their actions. Skinner’s reply: External consequences already haphazardly control people’s behavior. Why not administer those consequences toward human betterment? Wouldn’t reinforcers be more humane than the punishments used in homes, schools, and prisons? And if it is humbling to think that our history has shaped us, doesn’t this very idea also give us hope that we can shape our future?

Module 27 REVIEW

27-1 What is *operant conditioning?*

- *Operant conditioning* is a type of learning in which behavior is strengthened if followed by a *reinforcer* or diminished if followed by a punisher.

27-2 Who was Skinner, and how is operant behavior reinforced and shaped?

- B. F. Skinner was a college English major and aspiring writer who later entered psychology graduate school. He became modern behaviorism's most influential and controversial figure.
- Expanding on Edward Thorndike's *law of effect*, B. F. Skinner and others found that the behavior of rats or pigeons placed in an *operant chamber* (Skinner box) can be *shaped* by using reinforcers to guide closer and closer approximations of the desired behavior.

27-3 How do positive and negative reinforcement differ, and what are the basic types of reinforcers?

- *Reinforcement* is any consequence that strengthens behavior. *Positive reinforcement* adds a desirable stimulus to increase the frequency of a behavior. *Negative reinforcement* reduces or removes an aversive stimulus to increase the frequency of a behavior.
- *Primary reinforcers* (such as receiving food when hungry or having nausea end during an illness) are innately satisfying—no learning is required.
- *Conditioned* (or secondary) *reinforcers* (such as cash) are satisfying because we have learned to associate them with more basic rewards (such as the food or medicine we buy with them).

- Immediate reinforcers (such as a purchased treat) offer immediate payback; delayed reinforcers (such as a paycheck) require the ability to delay gratification.

27-4 How do different reinforcement schedules affect behavior?

- A *reinforcement schedule* defines how often a response will be reinforced.
- In *continuous reinforcement* (reinforcing desired responses every time they occur), learning is rapid, but so is extinction if rewards cease.
- In *partial (intermittent) reinforcement* (reinforcing responses only sometimes), initial learning is slower, but the behavior is much more resistant to extinction.
  - *Fixed-ratio schedules* reinforce behaviors after a set number of responses; *variable-ratio schedules,* after an unpredictable number.
  - *Fixed-interval schedules* reinforce behaviors after set time periods; *variable-interval schedules,* after unpredictable time periods.

27-5 How does punishment differ from negative reinforcement, and how does punishment affect behavior?

- *Punishment* administers an undesirable consequence (such as spanking) or withdraws something desirable (such as taking away a favorite toy) in an attempt to decrease the frequency of a behavior (a child’s disobedience).
- Negative reinforcement (taking an aspirin) removes an aversive stimulus (a headache). This desired consequence (freedom from pain) increases the likelihood that the behavior (taking aspirin to end pain) will be repeated.
- Punishment can have undesirable side effects, such as suppressing rather than changing unwanted behaviors, encouraging discrimination (so that the undesirable behavior appears when the punisher is not present), creating fear, teaching aggression, and fostering depression and low

self-esteem.

27-6 Why did Skinner’s ideas provoke controversy?

- Critics of Skinner’s principles believed the approach dehumanized people by neglecting their personal freedom and seeking to control their actions. Skinner replied that people’s actions are already controlled by external consequences, and that reinforcement is more humane than punishment as a means for controlling behavior.

Multiple-Choice Questions

1. The purpose of reinforcement is to

a. cause a behavior to stop.
b. cause a behavior to diminish.
c. cause a behavior to continue.
d. strengthen the spontaneous recovery process.
e. cause a behavior to occur for only a limited amount of time.

2. Which of the following best describes negative reinforcement?

a. John stops shooting bad free-throws because his coach benches him when he does.
b. Brian studies hard because it earns him “A” grades in math.
c. Lillian used to walk to school but does not do so anymore because she was attacked by a dog last month.
d. Charles smokes because his anxiety is reduced when he does so.
e. Osel wears his seat belt because his driving teacher cited accident statistics in class.

3. Thorndike’s principle that behaviors followed by favorable consequences become more likely to be repeated is known as what?

a. Law of effect
b. Operant conditioning
c. Shaping
d. Respondent behavior

e. Discrimination

4. All of the following are examples of primary reinforcers except a

a. rat’s food reward in a Skinner box.
b. cold drink on a hot day.
c. high score on an exam for which a student studied diligently.
d. hug from a loved one.
e. large meal following an extended time without food.

5. Shea bought 10 tickets for the raffle for free homecoming entry, but she did not win. Months later she also buys 10 tickets for the senior prom raffle, hoping this will be the time she wins. Which schedule of reinforcement is best used to explain this scenario?

a. Fixed-ratio
b. Variable-ratio
c. Fixed-interval
d. Variable-interval
e. Continuous

Practice FRQs

1. Mom is frustrated because 3-year-old Maya has started to spit frequently. She has decided to temporarily put away one of Maya’s toys every time she spits. Mom is going to continue to do this until Maya has stopped spitting.

- Explain whether Mom’s plan uses reinforcement or punishment.
- Explain whether Mom’s plan is a positive or negative form of reinforcement or punishment.

Answer

1 point: The plan uses punishment, because it is designed to reduce the frequency of spitting. (Both the identification of punishment and the explanation are required to earn the point.) Page 289

1 point: This is negative punishment because toys are being taken away from Maya. (Both the identification of negative reinforcement and the explanation are required to earn the point.) Page 289

2. Your calculus teacher wants her students to be more diligent in completing their homework and, since you are taking AP® psychology, she has asked for your help. Give an example of how she could use each of the following to help her increase homework completion.

- Shaping
- Negative reinforcement
- Fixed-interval schedule of reinforcement

(3 points)

Module **28 Operant Conditioning’s Applications, and Comparison to Classical Conditioning**

LEARNING TARGETS

- 28-1 Discuss ways to apply operant conditioning principles at school, in sports, at work, at home, for self-improvement, and to manage stress.
- 28-2 Identify the characteristics that distinguish operant conditioning from classical conditioning.

Applications of Operant Conditioning

28-1 How might operant conditioning principles be applied at school, in sports, at work, at home, for self-improvement, and to manage stress?

Would you like to apply operant conditioning principles to your own life—to be a healthier person, a more successful student, or a high-achieving athlete? Reinforcement techniques are at work in schools, sports, workplaces, and homes (Flora, 2004). These principles can support our self-improvement and help us to manage stress as well.

AT SCHOOL More than 50 years ago, Skinner and others worked toward a day when "machines and textbooks" would shape learning in small steps by immediately reinforcing correct responses. Such machines and textbooks, they said, would revolutionize education and free teachers to focus on each student's special needs. "Good instruction demands two things," said Skinner (1989). "Students must be told immediately whether what they do is right or wrong and, when right, they must be directed to the step to be taken next."

Christopher Halloran/Shutterstock

Computer-assisted learning Computers have helped realize Skinner’s goal of individually paced instruction with immediate feedback.

Skinner might be pleased to know that many of his ideals for education are now possible. Teachers used to find it difficult to pace material to each student’s rate of learning and to provide prompt feedback. Online adaptive quizzing does both. Students move through quizzes at their own pace, according to their own level of understanding. And they get immediate feedback on their efforts.

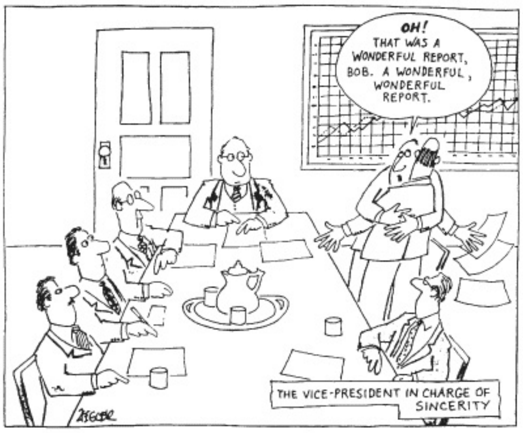
FYI

In later units we will learn more about how psychologists apply operant conditioning principles to help people moderate high blood pressure or gain social skills.

IN SPORTS The key to shaping behavior in athletic performance, as elsewhere, is first reinforcing small successes and then gradually increasing the challenge. Golf students can learn putting by starting with very short putts, and then, as they build mastery, stepping back farther and farther. Novice batters can begin with half swings at an oversized ball pitched from 10 feet away, giving them the immediate pleasure of smacking the ball. As the hitters’ confidence builds with their success and they achieve mastery at each level, the pitcher gradually moves back and eventually introduces a standard baseball. Compared with children taught by conventional methods, those trained by this behavioral method have shown faster skill improvement (Simek & O'Brien, 1981, 1988).

In sports as in the laboratory, the accidental timing of rewards can produce *superstitious behaviors.* If a Skinner box food dispenser gives a pellet of food every 15 minutes, whatever the animal happened to be doing just before the food arrives (perhaps scratching itself) is more likely to be repeated and reinforced, which occasionally can produce a persistent superstitious behavior. Likewise, if a baseball or softball player gets a hit after tapping the plate with the bat, he or she may be more likely to do so again. Over time the player may experience partial reinforcement for what becomes a superstitious behavior.

AT WORK Knowing that reinforcers influence productivity, many organizations have invited employees to share the risks and rewards of company ownership. Others focus on reinforcing a job well done. Rewards are most likely to increase productivity if the desired performance is both well-defined and achievable. The message for managers? *Reward specific, achievable behaviors, not vaguely defined "merit."*


OH! THAT WAS A WONDERFUL REPORT, BOB. A WONDERFUL, WONDERFUL REPORT.
THE VICE-PRESIDENT IN CHARGE OF SINCERITY
ZIEGLER

The New Yorker Collection, 1989, Ziegler from cartoonbank.com. All Rights Reserved.

Operant conditioning also reminds us that reinforcement should be *immediate.* IBM legend Thomas Watson understood this. When he observed an achievement, he wrote the employee a check on the spot (Peters & Waterman, 1982). But rewards need not be material, or lavish.

An effective manager may simply walk the floor and sincerely affirm people for good work, or write notes of appreciation for a completed project. As Skinner said, “How much richer would the whole world be if the reinforcers in daily life were more effectively contingent on productive work?”

IN PARENTING As we have seen, parents can learn from operant conditioning practices. Parent-training researchers remind us that by saying, “Get ready for bed” and then caving in to protests or defiance, parents reinforce such whining and arguing (Wierson & Forehand, 1994). Exasperated, they may then yell or gesture menacingly. When the child, now frightened, obeys, that reinforces the parents’ angry behavior. Over time, a destructive parent-child relationship develops.

FYI

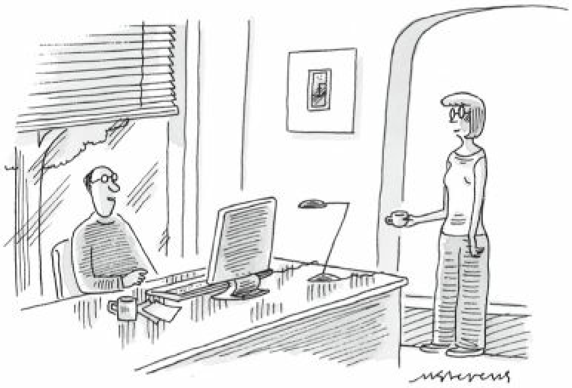
Notice how useful operant conditioning is. People with an understanding of the principles of operant conditioning possess a tool for changing behavior. If you don’t like the way your friends, teachers, coaches, or parents behave, pay attention to the uses of operant conditioning!

To disrupt this cycle, parents should remember that basic rule of shaping: *Notice people doing something right and affirm them for it.* Give children attention and other reinforcers when they are behaving *well*. Target a specific behavior, reward it, and watch it increase. When children misbehave or are defiant, don’t yell at them or hit them. Simply explain the misbehavior and take away the iPad, remove a misused toy, or give a brief time-out.

FOR SELF-IMPROVEMENT We can use operant conditioning in our own lives. To build up your *self-control*, you need to reinforce your own desired behaviors (perhaps to improve your study habits) and extinguish the undesired ones (to stop texting while studying, for example). Psychologists suggest taking these steps:

1. *State a realistic goal in measurable terms and announce it.* You might, for example, aim to boost your study time by an hour a day. To increase your commitment and odds of success, share that goal with friends.
2. *Decide how, when, and where you will work toward your goal.* Take time to plan. Those who specify how they will implement goals become more focused on those goals and more often fulfill them (Gollwitzer & Oettingen, 2012).
3. *Monitor how often you engage in your desired behavior.* You might log your current study time, noting under what conditions you do and don't study. (When we began writing textbooks, we each logged our time and were amazed to discover how much time we were wasting.)
4. *Reinforce the desired behavior.* People's persistence toward long-term goals, such as New Year's resolutions to study or exercise more, is powered mostly by immediate rewards (Wooley & Fishbach, 2017). So, to increase your study time, give yourself a reward (a snack or some activity you enjoy) only after you finish your extra hour of study. Agree with your friends that you will join them for weekend activities only if you have met your realistic weekly studying goal.
5. *Reduce the rewards gradually.* As your new behaviors become more habitual, give yourself a mental pat on the back instead of a cookie.

TO MANAGE STRESS In addition, we can literally learn from ourselves. There is some evidence that when we have feedback about our bodily responses, we can sometimes change those responses. When a few psychologists started experimenting with the idea that we could train people to counteract stress, many of their colleagues thought them foolish. After all, these functions are controlled by the autonomic ("involuntary") nervous system. Then, in the late 1960s, experiments by respected psychologists made the skeptics wonder. Neal Miller, for one, found that rats could modify their heartbeat if given pleasurable brain stimulation when their heartbeat increased or decreased. Later research revealed that some paralyzed humans could also learn to control their blood pressure (Miller & Brucker, 1979).



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"I wrote another five hundred words. Can I have another cookie?"

Miller was experimenting with **biofeedback**, a system of recording, amplifying, and feeding back information about subtle physiological responses. Biofeedback instruments mirror the results of a person's own efforts, thereby allowing the person to learn techniques for controlling a particular physiological response (**Figure 28.1**). After a decade of study, however, researchers decided the initial claims for biofeedback were overblown and oversold (Miller, 1985). A 1995 National Institutes of Health panel declared that biofeedback works best on tension headaches. And simple methods of physical activity and relaxation, such as exercise and meditation (see Module 44), can help us keep our stress levels under control.

biofeedback

a system for electronically recording, amplifying, and feeding back information regarding a subtle physiological state, such as blood pressure or muscle tension.

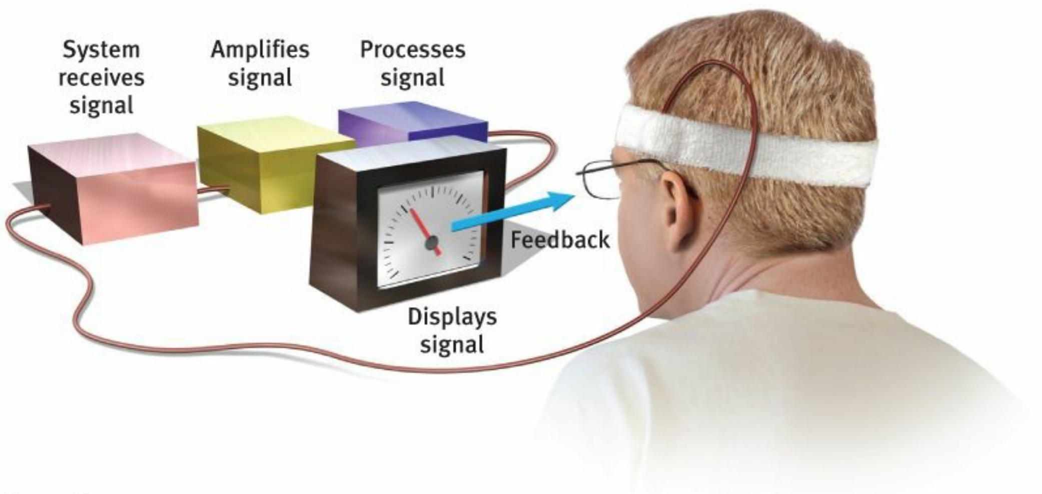

Figure 28.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 28.1 Biofeedback systems

Biofeedback systems—such as this one, which records tension in the forehead muscle of a headache sufferer—allow people to monitor their subtle physiological responses. As this man relaxes his forehead muscle, the pointer on the display screen (or a tone) may go lower.

Check Your Understanding

Ask Yourself

- Have you ever found yourself engaging in any superstitious behaviors before a big sporting event or performance? How would you explain this phenomenon?

Test Yourself

- Ethan constantly misbehaves at preschool even though his teacher scolds him repeatedly. Why does Ethan's misbehavior continue, and what can his teacher do to stop it?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Contrasting Classical and Operant Conditioning

28-2 How does operant conditioning differ from classical conditioning?

Flip It Video: Associative Learning Principles

Both classical and operant conditioning are forms of *associative learning.* Both involve *acquisition, extinction, spontaneous recovery, generalization,* and *discrimination.* But these two forms of learning also differ. Through classical (Pavlovian) conditioning, we associate different stimuli we do not control, and we respond automatically *(respondent behaviors)* (**Table 28.1**). Through operant conditioning, we associate our own behaviors—which act on our environment to produce rewarding or punishing stimuli *(operant behaviors)*—with their consequences.

AP® EXAM TIP

You may have to differentiate classical conditioning and operant conditioning on the AP® exam. Classical conditioning is involuntary (respondent) behavior, while operant conditioning is voluntary (operant) behavior.

TABLE 28.1 Comparison of Classical and Operant Conditioning

	Classical Conditioning	**Operant Conditioning**
Basic idea	Learning associations between events we do not control.	Learning associations between our behavior and its consequences.
Response	Involuntary, automatic.	Voluntary, operates on environment.
Acquisition	Associating events; NS is paired with US and becomes CS.	Associating a response with a consequence (reinforcer or punisher).

Extinction	CR decreases when CS is repeatedly presented alone.	Responding decreases when reinforcement stops.
Spontaneous recovery	The reappearance, after a rest period, of an extinguished CR.	The reappearance, after a rest period, of an extinguished response.
Generalization	The tendency to respond to stimuli similar to the CS.	Responses learned in one situation occurring in other, similar situations.
Discrimination	Learning to distinguish between a CS and other stimuli that do not signal a US.	Learning that some responses, but not others, will be reinforced.

As we shall see next, our biology and cognitive processes influence both classical and operant conditioning.

✓ Check Your Understanding

Ask Yourself

- Can you recall a time when a teacher, coach, family member, or employer helped you learn something by shaping your behavior in little steps until you achieved your goal?

Test Yourself

- Salivating in response to a tone paired with food is a(n) _______________ behavior; pressing a bar to obtain food is a(n) ________________ behavior.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 28 REVIEW

28-1 How might operant conditioning principles be applied at school, in sports, at work, at home, for self-improvement, and to manage stress?

- Teachers can use shaping techniques to guide students’ behaviors, and they can use interactive media to provide immediate feedback.
- In sports, where the accidental timing of rewards can produce superstitious behavior, coaches can nevertheless build players’ skills and self-confidence by rewarding small improvements.
- Managers can boost productivity and morale by rewarding well-defined and achievable behaviors.
- Parents can reward desired behaviors but not undesirable ones.
- We can shape our own behaviors by stating our goals, monitoring the frequency of desired behaviors, reinforcing desired behaviors, and gradually reducing rewards as behaviors become habitual.
- We can learn from our bodily responses to manage stress; *biofeedback* is one studied method.

28-2 How does operant conditioning differ from classical conditioning?

- In operant conditioning, an organism learns associations between its own behavior and resulting events; this form of conditioning involves operant behavior (behavior that operates on the environment, producing rewarding or punishing consequences).
- In classical conditioning, the organism forms associations between stimuli—events it does not control; this form of conditioning involves respondent behavior (automatic responses to some stimulus).

Multiple-Choice Questions

1. Paola has been classically conditioned to fear a red light because it has been paired with a loud noise. If the light is repeatedly presented without the loud noise she will eventually stop being afraid of the light. In this instance, _____ has occurred.

a. generalization
b. discrimination
c. spontaneous recovery
d. extinction
e. acquisition

2. Which of the following is the best advice to give parents whose young children refuse to eat their dinner?

a. Do not allow them to watch television for a week for each day they do not eat dinner.
b. Give the children a small reward at the end of a week in which they have eaten dinner each night.
c. Give the children a small reward each day that they eat their dinner.
d. Require that the children do extra chores if they do not finish dinner.
e. Allow the children to have dessert, even if they do not eat their dinner, in the hopes that they will eat dinner the next day.

3. The reappearance, after a rest period, of an extinguished response is called

a. acquisition.
b. spontaneous recovery.
c. discrimination.
d. operant conditioning.
e. classical conditioning.

4. Superstitious behavior can be produced by

a. placing a conditioned response (CR) before a conditioned stimulus (CS).
b. the accidental timing of rewards.
c. possession of a large number of traditionally lucky items.

d. cognitive awareness of superstitious behavior in others.
e. the change in a reinforcement schedule from ratio to interval.

Practice FRQs

1. Nish has received a new bike for his sixth birthday. Explain how each of the following terms can be applied as he learns to ride the bike.

- Shaping
- Reinforcement
- Generalization

Answer

1 point: Shaping: Nish’s parents should reinforce each small step that moves Nish toward riding the bike successfully. For example, first he might receive reinforcement for sitting on the bike, then for pedaling a small distance, and then finally, only after he rides the bike for a greater distance. Pages 294, 295

1 point: Reinforcement: Nish’s parents could give him a small reward or praise when he successfully rides the bike. Reinforcement will be most effective if it is immediate. Page 294

1 point: Generalization: Having learned to ride his own bike, Nish will be able to transfer what he has learned to other bikes. Page 297

2. The Shin family is eager to train their new puppy a couple of tricks. Explain how the Shins could use the following in their training:

- Positive reinforcement
- Schedules of reinforcement
- Shaping

(3 points)

Module 29 Biology, Cognition, and Learning

LEARNING TARGETS

- 29-1 Explain how biological constraints affect classical and operant conditioning.
- 29-2 Explain how cognitive processes affect classical and operant conditioning.
- 29-3 Identify the two ways people learn to cope with personal problems.
- 29-4 Describe how a perceived lack of control can affect people’s behavior and health.
- 29-5 Explain why self-control is important, and discuss whether it can be depleted.

From drooling dogs, running rats, and pecking pigeons, we have learned much about the basic processes of learning. But conditioning principles don’t tell us the whole story. Today’s learning theorists recognize that learning is the product of the interaction of biological, psychological, and social-cultural influences (**Figure 29.1**).

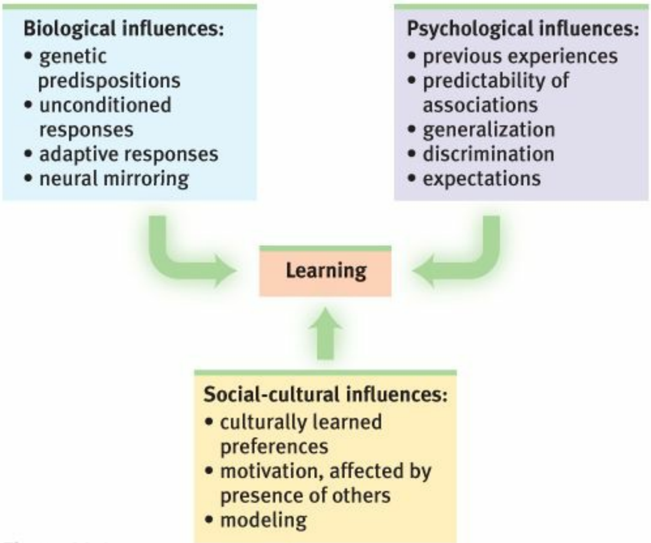
Biological influences:
• genetic predispositions
• unconditioned responses
• adaptive responses
• neural mirroring
Psychological influences:
• previous experiences
• predictability of associations
• generalization
• discrimination
• expectations
Learning
Social-cultural influences:
• culturally learned preferences
• motivation, affected by presence of others
• modeling

Figure 29.1

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Figure 29.1 Biopsychosocial influences on learning

Our learning results not only from environmental experiences, but also from cognitive and biological influences.

Biological Constraints on Conditioning

29-1 How do biological constraints affect classical and operant conditioning?

Ever since Charles Darwin, scientists have assumed that all animals share a common evolutionary history and thus share commonalities in their makeup and functioning. Pavlov and Watson, for example, believed the basic laws of learning were essentially similar in all animals. So it should make little difference whether one studied pigeons or people. Moreover, it seemed that any natural response could be conditioned to any neutral stimulus.

Biological Limits on Classical Conditioning

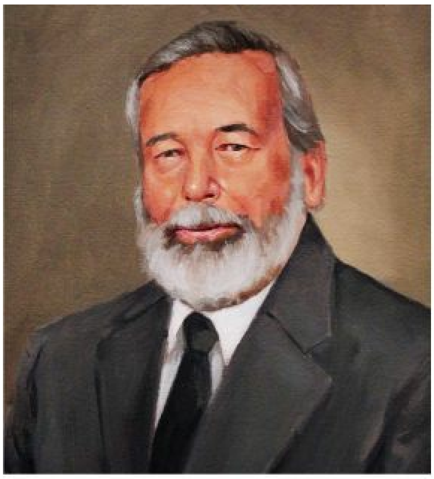
Flip It Video: Garcia's Research

In 1956, learning researcher Gregory Kimble proclaimed, "Just about any activity of which the organism is capable can be conditioned and . . . these responses can be conditioned to any stimulus that the organism can perceive" (p. 195). Twenty-five years later, he humbly acknowledged that "half a thousand" scientific reports had proven him wrong (Kimble, 1981). More than the early behaviorists realized, an animal's capacity for conditioning is limited by biological constraints. For example, each species' predispositions *prepare* it to learn the associations that enhance its survival—a phenomenon called **preparedness**. Environments are not the whole story. Biology matters.

preparedness

a biological predisposition to learn associations, such as between taste and nausea, that have survival value.

John Garcia was among those who challenged the prevailing idea that all associations can be learned equally well. While researching the effects of radiation on laboratory animals, Garcia and Robert Koelling (1966) noticed that rats began to avoid drinking water from the plastic bottles in radiation chambers. Could classical conditioning be the culprit? Might the rats have linked the plastic-tasting water (a CS) to the sickness (UR) triggered by the radiation (US)?



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John Garcia As the laboring son of California farmworkers, Garcia attended school only in the off-season during his early childhood years. After entering junior college in his late twenties, and earning his Ph.D. in his late forties, he received the American Psychological Association's Distinguished Scientific Contribution Award "for his highly original, pioneering research in conditioning and learning." He was also elected to the National Academy of Sciences.

To test their hunch, Garcia and Koelling exposed the rats to a particular taste, sight, or sound (CS) and later also to radiation or drugs (US) that led to nausea and vomiting (UR). Two startling findings emerged: First, even if sickened as late as several hours after tasting a particular novel flavor, the rats thereafter avoided that flavor. This appeared to violate the notion that for conditioning to occur, the US must immediately follow the CS.

Second, the sickened rats developed aversions to tastes but not to sights or sounds. This contradicted the behaviorists' idea that any perceivable stimulus could serve as a CS. But it made adaptive sense. For rats, the easiest way to identify tainted food is to taste it; if sickened after sampling a new food, they thereafter avoid it. This response, called *taste aversion*, makes it difficult to eradicate a population of "bait-shy" rats by poisoning.

Jose Oto/BSIP SA/Alamy

Taste aversion If you became violently ill after eating oysters, you would probably have a hard time eating them again. Their smell and taste would have become a CS for nausea. This learning occurs readily because our biology prepares us to learn taste aversions to toxic foods.

Humans, too, seem biologically prepared to learn some associations rather than others. If you become violently ill four hours after eating contaminated oysters, you will probably develop an aversion to the *taste* of oysters more readily than to the sight of the associated restaurant, its plates, the people you were with, or the music you heard there. (In contrast, birds, which hunt by sight, appear biologically primed to develop aversions to the *sight* of tainted food [Nicolaus et al., 1983].)

AP® EXAM TIP

In the middle of the twentieth century, behaviorism was the dominant perspective in psychology, with little attention paid to the influence of biology and cognition in learning. Now we know better. As you read through this module, notice how important biological and cognitive factors are for understanding learning. This module reflects the biological and cognitive perspectives on psychology learned about in Unit I. The psychological perspectives (approaches) are frequently seen on the AP® exam (see Table 2.1 on page 18).

Garcia’s early findings on taste aversion were met with an onslaught of criticism. As the German philosopher Arthur Schopenhauer (1788–1860) once said, important ideas are first ridiculed, then attacked, and finally taken for granted. Leading journals refused to publish Garcia’s work: The findings are impossible, said some critics. But, as sometimes happens in science, Garcia and Koelling’s oft-replicated taste-aversion research is now basic textbook material.

> “*Once bitten, twice shy.*”
>
> *G. F. Northall,* Folk-Phrases, *1894*

It is also a good example of experiments that begin with the discomfort of some laboratory animals and end by enhancing the welfare of many others. In one conditioned taste-aversion study, coyotes and wolves were tempted into eating sheep carcasses laced with a sickening poison. Thereafter, they developed an aversion to sheep meat; two wolves later penned with a live sheep seemed actually to fear it (Gustavson et al., 1974, 1976). These studies not only saved the sheep from their predators, but also saved the sheep-shunning coyotes and wolves from angry ranchers and farmers who had wanted to destroy them. Similar applications have prevented baboons from raiding African gardens, raccoons from attacking chickens, and ravens and crows from feeding on crane eggs. In all these cases, research helped preserve both the prey and their predators, all of which occupy an important ecological niche (Dingfelder, 2010; Garcia & Gustavson, 1997).

Such research supports Darwin’s principle that natural selection favors traits that aid survival. Our ancestors who readily learned taste aversions were unlikely to eat the same toxic food again and were more likely to survive and leave descendants. Nausea, like anxiety, pain, and other bad feelings, serves a good purpose. Like a low-oil warning on a car dashboard, each alerts the body to a threat (Davidson & Riley, 2015; Neese, 1991).

> “*All animals are on a voyage through time, navigating toward futures that promote their survival and away from futures that threaten it. Pleasure and pain are the stars by which they steer.*”
>
> *Psychologists Daniel T. Gilbert and Timothy D. Wilson, “Prospection: Experiencing the Future,” 2007*

Our preparedness to associate a CS with a US that follows predictably and immediately is adaptive. Causes often do immediately precede effects. But as we saw in the taste-aversion findings, our predisposition to associate an effect with a preceding event can trick us. When chemotherapy triggers nausea and vomiting more than an hour following treatment, cancer patients may over time develop classically conditioned nausea (and sometimes anxiety) to the sights, sounds, and smells associated with the clinic (**Figure 29.2**) (Hall, 1997). Merely returning to the clinic’s waiting room or seeing the nurses can provoke these conditioned feelings (Burish & Carey, 1986; Davey, 1992). Under normal circumstances, such revulsion to sickening stimuli would be adaptive.

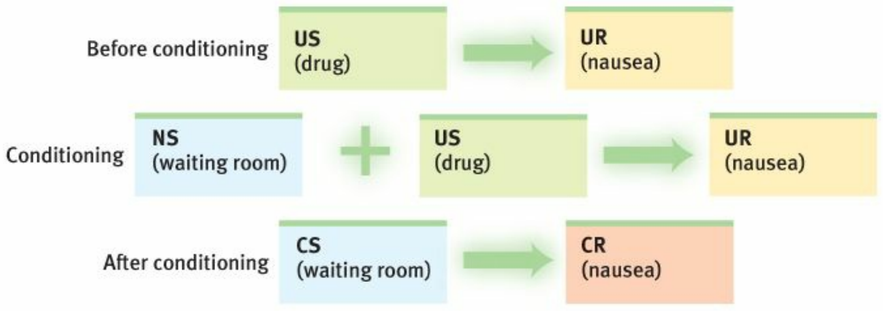

Figure 29.2
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Figure 29.2 Nausea conditioning in cancer patients

blickwinkel/Alamy

Animal taste aversion As an alternative to killing wolves and coyotes that preyed on sheep, some ranchers have sickened the animals with lamb laced with a drug to create a taste aversion.

✓ Check Your Understanding

Ask Yourself

- What different foods or beverages have you eventually grown to like—or dislike—since you were a child? Has falling ill after enjoying a special treat ever changed a one-time like to a definite dislike?

Test Yourself

- How did Garcia and Koelling's taste-aversion studies help disprove Gregory Kimble's early claim that "just about any activity of which the organism is capable can be conditioned . . . to any stimulus that the organism can perceive"?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Biological Limits on Operant Conditioning

Nature also constrains each species' capacity for operant conditioning. Science fiction writer Robert Heinlein (1907–1988) said it well: "Never try to teach a pig to sing; it wastes your time and annoys the pig."

FYI

For more information on animal behavior, see books by (we are not making this up) Robin Fox and Lionel Tiger.

We most easily learn and retain behaviors that reflect our biological predispositions. Thus, using food as a reinforcer, you could easily condition a hamster to dig or to rear up, because these are among the animal’s natural food-searching behaviors. But you won’t be so successful if you use food as a reinforcer to shape face washing and other hamster behaviors that aren’t normally associated with food or hunger (Shettleworth, 1973). Similarly, you could easily teach pigeons to flap their wings to avoid being shocked, and to peck to obtain food: Fleeing with their wings and eating with their beaks are natural pigeon behaviors. However, pigeons would have a hard time learning to peck to avoid a shock, or to flap their wings to obtain food (Foree & LoLordo, 1973). The principle: *Biological constraints predispose organisms to learn associations that are naturally adaptive.*

In the early years of their work, animal trainers Marian Breland and Keller Breland presumed that operant principles would work on almost any response an animal could make. But along the way, they too learned about biological constraints. In one act, pigs trained to pick up large wooden “dollars” and deposit them in a piggy bank began to drift back to their natural ways. They dropped the coin, pushed it with their snouts as pigs are prone to do, picked it up again, and then repeated the sequence—delaying their food reinforcer. This **instinctive drift** occurred as the animals reverted to their biologically predisposed patterns.

instinctive drift
the tendency of learned behavior to gradually revert to biologically predisposed patterns.

Jeffery Jones/ The Gallup Independent/AP Photo

Natural athletes Animals can most easily learn and retain behaviors that draw on their biological predispositions, such as horses’ inborn ability to move around obstacles with speed and agility.

Cognition’s Influence on Conditioning

29-2 How do cognitive processes affect classical and operant conditioning?

Cognition and Classical Conditioning

Flip It Video: Rescorla’s Research

In their dismissal of “mentalistic” concepts such as consciousness, Pavlov and Watson underestimated the importance of not only biological constraints such as preparedness and instinctive drift, but also the effects of cognitive processes (thoughts, perceptions, expectations). The early behaviorists believed that rats’ and dogs’ learned behaviors could be reduced to mindless mechanisms, so there was no need to consider cognition. But Robert Rescorla and Allan Wagner (1972) showed that an animal can learn the *predictability* of an event. If a shock always is preceded by a tone, and then may also be preceded by a light that accompanies the tone, a rat will react with fear to the tone but not to the light. Although the light is always followed by the shock, it adds no new information; the tone is a better predictor. The more predictable the association, the stronger the conditioned response. It’s as if the animal learns an *expectancy*, an awareness of how likely it is that the US will occur.

> “*All brains are, in essence, anticipation machines.*”
>
> *Daniel C. Dennett,* Consciousness Explained, *1991*

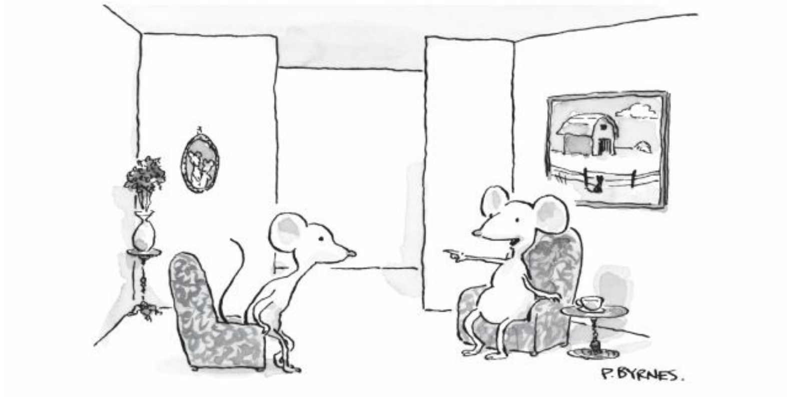
Associations can influence attitudes (Hofmann et al., 2010). When British children viewed novel cartoon characters alongside either ice cream *(Yum!)* or brussels sprouts *(Yuck!)*, they came to prefer the ice-cream-associated characters (Field, 2006). Other researchers have classically conditioned adults’ attitudes using little-known Pokémon characters (Olson & Fazio, 2001). The participants were tasked with pressing a button whenever a specific target Pokémon character appeared on a video screen that displayed a stream of words and images. Unnoticed by the participants, when two other Pokémon characters appeared on the screen, one was consistently associated with positive words and images (such as *awesome* or a hot fudge sundae); the other appeared with negative words and images (such as *awful* or a cockroach). Later, they evaluated the extra Pokémon characters. Without any conscious memory of the pairings, the participants preferred the characters associated with the positive stimuli.

Follow-up studies indicate that conditioned likes and dislikes are even stronger when people notice and are aware of the associations they have learned (Shanks, 2010). Cognition matters.

Such experiments help explain why classical conditioning treatments that ignore cognition often have limited success. For example, people receiving therapy for alcohol use disorder may be given alcohol spiked with a nauseating drug. Will they then associate alcohol with sickness? If classical conditioning were merely a matter of "stamping in" stimulus associations, we might hope so, and to some extent this does occur (as we will see in Module 71). However, one's awareness that the nausea is induced by the drug, not the alcohol, often weakens the association between drinking alcohol and feeling sick, reducing the treatment's effectiveness. So, even in classical conditioning, it is—especially with humans—not simply the CS-US association, but also the thought that counts.

Cognition and Operant Conditioning

B. F. Skinner acknowledged the biological underpinnings of behavior and the existence of private thought processes. Nevertheless, many psychologists criticized him for discounting cognition's importance.



The New Yorker Collection, 2000, Pat Byrnes, from cartoonbank.com.
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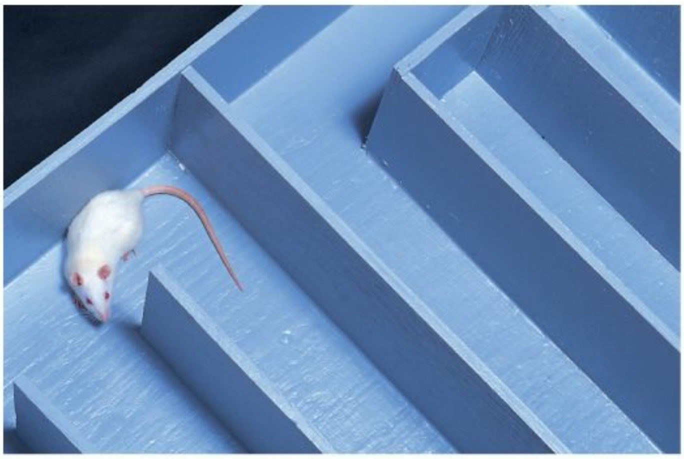
"Bathroom? Sure, it's just down the hall to the left, jog right, left, another left, straight past two more lefts, then right, and it's at the end of the third corridor on your right."

A mere eight days before dying of leukemia in 1990, Skinner stood before the American Psychological Association convention. In this final address, he still resisted the growing belief that cognitive processes (thoughts, perceptions, expectations) have a necessary place in the science of psychology and even in our understanding of conditioning. He viewed "cognitive science" as a throwback to early twentieth-century introspectionism. For Skinner, thoughts and emotions were behaviors that follow the same laws as other behaviors.

Nevertheless, the evidence of cognitive processes cannot be ignored. For example, animals on a *fixed-interval reinforcement schedule* respond more and more frequently as the time approaches when a response will produce a reinforcer. Although a strict behaviorist would object to talk of "expectations," the animals behave as if they expected that repeating the response would soon produce the reward.

Latent Learning



Will & Deni McIntyre/Science Source

Latent learning Animals, like people, can learn from experience, with or without reinforcement. In a classic experiment, rats in one group repeatedly explored a maze, always with a food reward at the end. Rats in another group explored the maze with no food reward. But once given a food reward at the end, rats in the second group thereafter ran the maze as quickly as (and even faster than) the always-rewarded rats (Tolman & Honzik, 1930).

Evidence of cognitive processes has also come from studying rats in mazes, including classic studies by Edward Chase Tolman (1886–1959) and Charles Honzik that were done in Skinner's youth. Rats exploring a maze, given no obvious rewards, seem to develop a **cognitive map**, a mental representation of the maze, much like your mental map of your school. This map, and the rats' learning, is not demonstrated until the experimenter places food in the maze's goal box, which motivates the rats to run the maze at least as quickly and efficiently as other rats that were previously reinforced with food for this result.

cognitive map

a mental representation of the layout of one's environment. For example, after exploring a maze, rats act as if they have learned a cognitive map of it.

Like people sightseeing in a new town, the exploring rats seemingly experienced **latent learning** during their earlier tours. That learning became apparent only when there was some incentive to demonstrate it. Children, too, may learn from watching a parent but demonstrate the learning only much later, as needed. *The point to remember: There is more to learning than associating a response with a consequence; there is also cognition*. In Unit VII we will encounter more striking evidence of cognitive abilities in solving problems and in using language.

latent learning

learning that occurs but is not apparent until there is an incentive to demonstrate it.

Insight Learning

Some learning occurs after little or no systematic interaction with our environment. For example, we may puzzle over a problem and, suddenly, and the pieces fall together as we perceive the solution in a sudden flash of **insight**—an abrupt, true-seeming, and often satisfying solution (Topolinski & Reber, 2010). Ten-year-old Johnny Appleton's insight solved a problem that had stumped construction workers: how to rescue a young robin from a narrow 30-inch-deep hole in a cement-block wall. Johnny's solution: Slowly pour in sand, giving the bird enough time to keep its feet on top of the constantly rising pile (Ruchlis, 1990).

insight

a sudden realization of a problem's solution; contrasts with strategy-based solutions.

Intrinsic and Extrinsic Motivation

The cognitive perspective has also shown us the limits of rewards: Promising people a reward for a task they already enjoy can backfire. Excessive rewards can destroy **intrinsic motivation**—the desire to perform a behavior effectively and for its own sake. In experiments, children have been promised a payoff for playing with an interesting puzzle or toy. Later, they played with the toy *less* than did unpaid children

(Deci et al., 1999; Tang & Hall, 1995). Likewise, rewarding children with toys or candy for reading diminishes the time they spend reading (Marinak & Gambrell, 2008). It is as if they think, “If I have to be bribed into doing this, it must not be worth doing for its own sake.”

intrinsic motivation

a desire to perform a behavior effectively for its own sake.

To sense the difference between intrinsic motivation and **extrinsic motivation** (behaving in ways that gain external rewards or avoid punishment), think about your experience in this course. Are you feeling pressured to finish this reading before a deadline? Worried about your grade? Eager for college credit by doing well on the AP® exam? If *Yes*, then you are extrinsically motivated (as, to some extent, almost all students must be). Are you also finding the material interesting? Does learning it make you feel more competent? If there were no grade at stake, might you be curious enough to want to learn the material for its own sake? If *Yes*, intrinsic motivation also fuels your efforts.

extrinsic motivation

a desire to perform a behavior to receive promised rewards or avoid threatened punishment.

Youth sports coaches who aim to promote enduring interest in an activity, not just to pressure players into winning, focus on the intrinsic joys of playing and reaching one’s potential (Deci & Ryan, 1985, 2009). Doing so may also lead to greater rewards. Students who focus on learning (intrinsic reward) often get good grades and graduate (extrinsic rewards). Doctors who focus on healing (intrinsic) may make a good living (extrinsic). Indeed, research suggests that people who focus on their work’s meaning and significance not only do better work but ultimately earn more extrinsic rewards (Wrzesniewski et al., 2014).

Courtesy Christine Brune

Pure love If this girl were suddenly told that she must look after her baby cousin from now on, she might lose some of the joy that her intrinsic motivation to care for him has provided.

Nevertheless, extrinsic rewards used to signal a job well done (rather than to bribe or control someone) can be effective (Boggiano et al., 1985). “Most improved player” awards, for example, can boost feelings of competence and increase enjoyment of a sport. Rightly administered, rewards can improve performance and spark creativity (Eisenberger & Aselage, 2009; Henderlong & Lepper, 2002). And the rewards that often follow academic achievement, such as scholarships and jobs, are here to stay.

Table 29.1 compares the biological and cognitive influences on classical and operant conditioning.

TABLE 29.1 Biological and Cognitive Influences on Conditioning

	Classical Conditioning	Operant Conditioning
Biological influences	Natural predispositions constrain what stimuli and responses can easily be associated.	Organisms most easily learn behaviors similar to their natural behaviors; unnatural behaviors instinctively drift back toward natural ones.
Cognitive	Organisms develop an	Organisms develop an expectation that a

influences	expectation that a CS signals the arrival of a US.	response will be reinforced or punished; they also exhibit latent learning, without reinforcement.

✓ Check Your Understanding

Ask Yourself

- How are you intrinsically motivated? What are some extrinsic motivators in your life?

Test Yourself

- Instinctive drift and latent learning are examples of what important idea?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Learning and Personal Control

29-3 In what two ways do people learn to cope with personal problems?

Problems are unavoidable. This fact gives us a clear message: We need to learn to cope with the problems in our lives, alleviating the *stress* they cause with emotional, cognitive, or behavioral methods. We address some problems, called stressors, directly, with **problem-focused coping**. If our impatience leads to a family fight, we may go directly to that family member to work things out. We tend to use problem-focused strategies when we feel a sense of control over a situation and think we can change the circumstances, or at least change ourselves to deal with the circumstances more capably. We turn to **emotion-focused coping** when we *believe* we cannot change a situation. If, despite our best efforts, we cannot get along with that family member, we may relieve stress by reaching out to friends for support and comfort. This can be adaptive, but sometimes our emotion-focused coping can harm our health, such as when we respond by eating comforting but fattening foods. When challenged, some of us tend to respond with cool problem-focused coping, others with emotion-focused coping (Connor-Smith & Flachsbart, 2007). Our feelings of **personal control**, our explanatory style, and our supportive connections all influence our ability to cope successfully.

problem-focused coping

attempting to alleviate stress directly—by changing the stressor or the way we interact with that stressor.

emotion-focused coping

attempting to alleviate stress by avoiding or ignoring a stressor and attending to emotional needs related to our stress reaction.

personal control

our sense of controlling our environment rather than feeling helpless.

Huntstock, Inc/Alamy

Emotion-focused coping Reaching out to friends can help us attend to our emotional needs in stressful situations.

Perceived Loss of Control

29-4 How does a perceived lack of control affect people’s behavior and health?

Learning also influences our sense of empowerment versus helplessness. Picture the scene: Two rats receive simultaneous shocks. One can turn a wheel to stop the shocks. The helpless rat, but not the wheel turner, becomes more susceptible to ulcers and lowered immunity to disease (Laudenslager & Reite, 1984). In humans, too, uncontrollable threats trigger the strongest stress responses (Dickerson & Kemeny, 2004).

Any of us may feel helpless, hopeless, and depressed after experiencing a series of bad events beyond our personal control. Martin Seligman and his colleagues have shown that for some animals and people, a series of uncontrollable events creates a state of **learned helplessness**, with feelings of passive resignation (**Figure 29.3**). In experiments, dogs were strapped in a harness and given repeated shocks, with no opportunity to avoid them (Seligman & Maier, 1967). Later, when placed in another situation where they *could* escape the punishment by simply leaping a hurdle, the dogs displayed learned helplessness; they cowered as if without hope. Other dogs that had been able to escape the first shocks reacted differently. They had learned they were in control and easily escaped the shocks in the new situation (Seligman & Maier, 1967). People have shown similar patterns of learned helplessness (Abramson et al., 1978, 1989; Seligman, 1975).

learned helplessness

the hopelessness and passive resignation an animal or person learns when unable to avoid repeated aversive events.

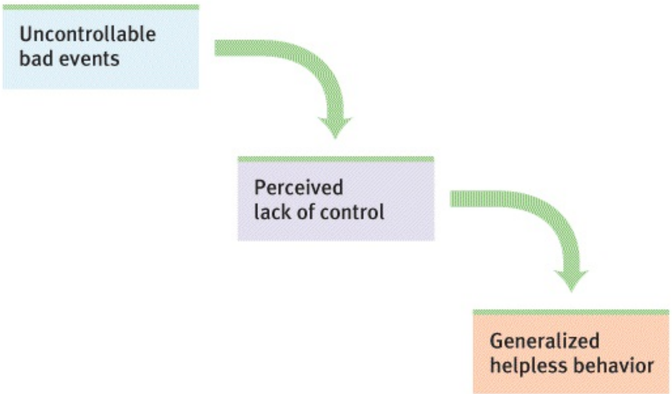

Uncontrollable bad events
Perceived lack of control
Generalized helpless behavior

Figure 29.3
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Figure 29.3 Learned helplessness

When animals and people experience no control over repeated bad events, they often learn helplessness.

Perceiving a loss of control, we become more vulnerable to stress and ill health. A famous study of elderly nursing home residents with little perceived control over their activities found that they declined faster and died sooner than those given more control (Rodin, 1986). Workers able to adjust office furnishings and control interruptions and distractions in their work environment have also experienced less stress (O'Neill, 1993). Such findings help explain why British executives have tended to outlive those in clerical or laboring positions, and why Finnish workers with low job stress have been less than half as likely to die of stroke or heart disease as those with a demanding job and little control. The more control workers have, the longer they live (Bosma et al., 1997, 1998; Kivimaki et al., 2002;

Marmot et al., 1997).

Control also helps explain a link between economic status and longevity (Jokela et al., 2009). In one study of 843 grave markers in an old cemetery in Glasgow, Scotland, those with the costliest, highest pillars (indicating the most affluence) tended to have lived the longest (Carroll et al., 1994). Likewise, American presidents, who are generally wealthy and well-educated, have had above-average life spans (Olshansky, 2011). Across cultures, high economic status predicts a lower risk of heart and respiratory diseases (Sapolsky, 2005). Wealthy parents also tend to have wealthy, healthy children (Savelieva et al., 2016). With higher economic status come reduced risks of low birth weight, infant mortality, smoking, and violence. Even among other primates, those at the bottom of the social pecking order have been more likely than their higher-status companions to become sick when exposed to a cold-like virus (Cohen et al., 1997).

Why does perceived loss of control predict health problems? Because losing control provokes an outpouring of stress hormones. When rats cannot control shock or when humans or other primates feel unable to control their environment, stress hormone levels rise, blood pressure increases, and immune responses drop (Rodin, 1986; Sapolsky, 2005). Captive animals experience more stress and are more vulnerable to disease than their wild counterparts (Roberts, 1988). Human studies confirm that stress increases when we lack control. The greater nurses’ workload, the higher their cortisol level and blood pressure—but only among nurses who reported little control over their environment (Fox et al., 1993). The crowding in high-density neighborhoods, prisons, and college and university dorms is another source of diminished feelings of control—and of elevated levels of stress hormones and blood pressure (Fleming et al., 1987; Ostfeld et al., 1987).

Increasing control—allowing prisoners to move chairs and to control room lights and the TV; having workers participate in decision making; allowing people to personalize their workspace—has noticeably improved health and morale (Humphrey et al., 2007; Ng et al., 2012; Ruback et al., 1986). In the case of nursing home residents, 93 percent of those who were encouraged to exert more control became more alert, active, and happy (Rodin, 1986). As researcher Ellen Langer concluded, “Perceived control is basic to human functioning” (1983, p. 291). “For the young and old alike,” she suggested, environments should enhance people’s sense of control over their world. No wonder mobile devices and online streaming, which enhance our control of the content and timing of our entertainment, are so popular. When a massive earthquake hit the Chinese city of Ya’an in 2013, victims took control of the situation by using their mobile devices. Those who sent frequent text messages and used mood-improving apps suffered the least stress (Jia et al., 2016).

Google has incorporated these principles effectively. Each week, Google employees can spend 20 percent of their working time on projects they find personally interesting. This Innovation Time Off program has increased employees’ personal control over their work environment, and it has paid off: Gmail was developed this way.

People thrive when they live in conditions of personal freedom and empowerment. At the national level, citizens of stable democracies report higher levels of happiness (Inglehart et al., 2008). Freedom and personal control foster human flourishing. But does ever-increasing choice breed ever-happier lives? Some researchers suggest that today’s Western cultures offer an “excess of freedom”—too many choices. The result can be decreased life satisfaction, increased depression, or even behavior paralysis (Schwartz, 2000, 2004). In one study, people offered a choice of one of 30 brands of jam or chocolate were less satisfied with their decision than were others who had chosen from only 6 options (Iyengar & Lepper, 2000). This *tyranny of choice* brings information overload and a greater likelihood that we will feel regret over some of the things we left behind. (Do you, too, ever waste time agonizing over too many choices?)

Habitat for Humanity
Palm Beach County

Thomas Cordy/The Palm Beach Post/ZUMAPRESS.com

Happy to have control Working alongside Habitat for Humanity volunteers, this family helped build their own new home.

Internal Versus External Locus of Control

If experiencing a loss of control can be stressful and unhealthy, do people who generally *perceive* they have control of their lives enjoy better health? Consider your own perceptions of control. Do you believe that your life is beyond your control? That getting a good job depends mainly on being in the right place at the right time? Or do you more strongly believe that you control your own fate? That being a success is a matter of hard work?

Hundreds of studies have compared people who differ in their perceptions of control. On the one side are those who have what psychologist Julian Rotter called an **external locus of control**, the perception that chance or outside forces control their fate. In one study of more than 1200 Israeli individuals exposed to missile attacks, those with an external locus of control experienced the most posttraumatic stress disorder symptoms (Hoffman et al., 2016). On the other side are those who perceive an **internal locus of control**, who believe they control their own destiny. In study after study, the “internals” have achieved more in school and work, acted more independently, enjoyed better health, and felt less depressed than did the “externals” (Lefcourt, 1982; Ng et al., 2006). In longitudinal research on more than 7500 people, those who had expressed a more internal locus of control at age 10 exhibited less obesity, lower blood pressure, and less distress at age 30 (Gale et al., 2008). Compared with nonleaders, military and business leaders have lower-than-average levels of stress hormones and report less anxiety, thanks to their greater sense of control (Sherman et al., 2012).

external locus of control

the perception that chance or outside forces beyond our personal control determine our fate.

internal locus of control

the perception that we control our own fate.

Compared with their parents' generation, more young Americans now express an external locus of control (Twenge et al., 2004). This shift may help explain an associated increase in rates of depression and other psychological disorders in young people (Twenge et al., 2010).

Another way to say that we believe we are in control of our own life is to say we have *free will*. Studies show that people who believe they have free will learn better, perform better at work, and behave more helpfully (Job et al., 2010; Stillman et al., 2010). They also tend to enjoy making decisions, favor punishing rule breakers, and oppose behavior-restricting government regulations (Clark et al., 2014; Feldman et al., 2014; Hannikainen et al., 2016) These people also tend to demonstrate another type of control known as *willpower* or *self-control*—an important related topic we turn to next.

Building Self-Control

29-5 Why is self-control important, and can our self-control be depleted?

When we have a sense of personal control over our lives, we are more likely to develop **self-control**—the ability to control impulses and delay short-term gratification for longer-term rewards. Self-control predicts good health, higher income, and better school performance (Bub et al., 2016; Keller et al., 2016; Moffitt et al., 2011). In studies of American, Asian, and

New Zealander children, self-control outdid intelligence test score in predicting future academic and life success (Duckworth & Seligman, 2005; Poulton et al., 2015; Wu et al., 2016).

self-control

the ability to control impulses and delay short-term gratification for greater long-term rewards.

Strengthening self-control requires attention and energy—similar to strengthening a muscle. It’s easy to form bad habits, but it takes hard work to break them. With frequent practice in overcoming unwanted urges, people have strengthened their self-control, as seen in their improved self-management of anger, dishonesty, smoking, and impulsive spending (Beames et al., 2017; Wang et al., 2017).

LatitudeStock - Brian Fairbrother/Getty Images

Extreme self-control Our ability to exert self-control increases with practice, and some of us have practiced more than others! A number of performing artists make their living as very convincing human statues, as does this actress performing on The Royal Mile in Edinburgh, Scotland.

Self-control varies over time. Like a muscle, it tends to weaken after use, recover after rest, and grow stronger with exercise (Baumeister & Vohs, 2016). In one famous experiment, hungry people who had spent some of their willpower resisting the temptation to eat chocolate chip cookies then abandoned a tedious task sooner than did others (Baumeister et al., 1998). Researchers are debating the reliability of this “depletion effect.” But the big lesson of self-control research remains: Develop self-discipline, and your self-control can help you have a healthier, happier, and more successful life (Tuk et al., 2015). The next time you face the temptation of studying versus having fun, remember that delaying a little fun now can lead to bigger future rewards.

✓ Check Your Understanding

Ask Yourself

- Consider your own ability to resist temptation. Can you think of some ways that you have developed your self-control as you have gotten older, especially since starting high school?

Test Yourself

- To cope with stress when we feel in control of our world, we tend to use _______________-focused (emotion/problem) strategies. To cope with stress when we believe we cannot change a situation, we tend to use _______________- focused (emotion/problem) strategies.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 29 REVIEW

29-1 How do biological constraints affect classical and operant conditioning?

- An animal's capacity for conditioning is limited by biological constraints, so that learning some associations is easier than learning others.
- Learning is adaptive: Each species learns behaviors that aid its survival—a phenomenon called *preparedness.* Those who readily learned taste aversions were unlikely to eat the same toxic food again and were more likely to survive and leave descendants.
- Nature constrains each species' capacity for both classical conditioning and operant conditioning. Our preparedness to associate a CS with a US that follows predictably and immediately is often (but not always) adaptive. During operant training, animals may display *instinctive drift* by reverting to biologically predisposed patterns.

29-2 How do cognitive processes affect classical and operant conditioning?

- In classical conditioning, animals may learn when to expect a US and may be aware of the link between stimuli and responses.
- In operant conditioning, *cognitive mapping* and *latent learning* research demonstrate the importance of cognitive processes in learning.
- Other research shows that some learning can occur after little or no systematic interaction with our environment (*insight* learning), and that excessive rewards (driving *extrinsic motivation*) can undermine *intrinsic motivation.*

29-3 In what two ways do people learn to cope with personal problems?

- We use direct, *problem-focused coping* when we feel a sense of control over a situation and believe we can change the stressor or the way we interact with it.
- When we believe we cannot avoid a stressor and cannot change the situation, we use *emotion-focused coping*— tending to our emotional needs related to the stress reaction.

29-4 How does a perceived lack of control affect people's behavior and health?

- We may feel helpless, hopeless, and depressed when experiencing bad events beyond our *personal control*. Being unable to avoid repeated aversive events can lead to *learned helplessness*.
- People who perceive an *internal locus of control* achieve more, enjoy better health, and are happier than those who perceive an *external locus of control*. A perceived lack of control provokes an outpouring of hormones that put people's health at risk.

29-5 Why is self-control important, and can our self-control be depleted?

- *Self-control* requires attention and energy, but it predicts good health, higher income, and better school performance. Studies have shown self-control to be a better predictor of future academic and life success than intelligence test score.
- Self-control varies over time, and while researchers disagree about the factors influencing it, strengthening self-control can lead to a healthier, happier, and more successful life.

Multiple-Choice Questions

1. When parents offer good-grade rewards to children who already enjoy studying, they may find that the children no longer enjoy studying and only enjoy the rewards. Which of the following have the parents accidentally removed from their children?

a. Latent learning
b. Extrinsic motivation
c. Intrinsic motivation
d. Insight learning
e. Emotion-focused coping

2. Which ability is likely to predict good adjustment, better grades, and social success?

a. Self-control
b. An external locus of control
c. Problem-focused coping
d. Learned helplessness
e. Emotion-focused coping

3. Elephants appear to have excellent _____ because they can remember large sections of their territory.

a. latent learning
b. insight
c. cognitive maps
d. extrinsic motivation
e. mirror neurons

4. The perception that we control our own fate is also called what?

a. Self-control
b. Learned helplessness
c. Internal locus of control
d. External locus of control
e. Emotion-focused coping

5. A woman had been pondering a problem for days and was about to give up when, suddenly, the solution came to her. Her experience can be best described as what?

a. Cognitive mapping
b. Insight

c. Operant conditioning
d. Classical conditioning
e. Unconscious associative learning

Practice FRQs

1. Missy studied for several hours before taking her history test, motivated by the goal of achieving a good grade that would get her a scholarship. She failed the test and now refuses to study for other tests. Explain how the following terms relate to this scenario.

- Extrinsic motivation
- Learned helplessness

Answer

1 point: Missy was extrinsically motivated to study for her test. She wanted the good grade in order to get a scholarship. Page 305

1 point: After failing to get the good grade, Missy demonstrates learned helplessness: She now believes there is no use studying and that studying won't help her succeed. Page 307

2. Describe how each of the following can show the impact of cognition on operant conditioning.

- Latent learning
- Insight learning
- Intrinsic motivation

(3 points)

Module **30 Observational Learning**

LEARNING TARGETS

- **30-1 Differentiate observational learning from associative learning, and explain how observational learning may be enabled by neural mirroring.**
- **30-2 Discuss the impact of prosocial modeling and of antisocial modeling.**
- **30-3 Discuss the violence-viewing effect.**

30-1 How does observational learning differ from associative learning, and how may observational learning be enabled by neural mirroring?

Cognition supports **observational learning** (also called *social learning*), in which higher animals, especially humans, learn without direct experience, by watching and imitating others. A child who sees his sister burn her fingers on a hot stove learns not to touch it. We learn our native languages and various other specific behaviors by observing and imitating others, a process called **modeling**.

observational learning

learning by observing others. (Also called *social learning*.)

modeling

the process of observing and imitating a specific behavior.

Picture this scene from an experiment by Albert Bandura, the pioneering researcher of observational learning (Bandura et al., 1961): A preschool child works on a drawing. An adult in another part of the room builds with Tinkertoys. As the child watches, the adult gets up and for nearly 10 minutes pounds, kicks, and throws around the room a large inflated Bobo doll, yelling, “Sock him in the nose. . . . Hit him down. . . . Kick him.”

Polaris/Newscom

Albert Bandura “The Bobo doll follows me wherever I go. The photographs are published in every introductory psychology text and virtually every undergraduate takes introductory psychology. I recently checked into a Washington hotel. The clerk at the desk asked, ‘Aren’t you the psychologist who did the Bobo doll experiment?’ I answered, ‘I am afraid that will be my legacy.’ He replied, ‘That deserves an upgrade. I will put you in a suite in the quiet part of the hotel’” (2005). A recent analysis of citations, awards, and textbook coverage identified Bandura—shown here receiving a 2016 U.S. National Medal of Science from President Obama—as the world’s most eminent psychologist (Diener et al., 2014).

The child is then taken to another room filled with appealing toys. Soon the experimenter returns and tells the child she has decided to save these good toys “for the other children.” She takes the now-frustrated child to a third room containing a few toys, including a Bobo doll. Left alone, what does the child do?

Compared with children not exposed to the adult model, those who viewed the model’s actions were more likely to lash out at the doll. Observing the aggressive outburst apparently lowered their inhibitions. But *something more* was also at work, for the children imitated the very acts they had observed and used the very words they had heard (**Figure 30.1**).

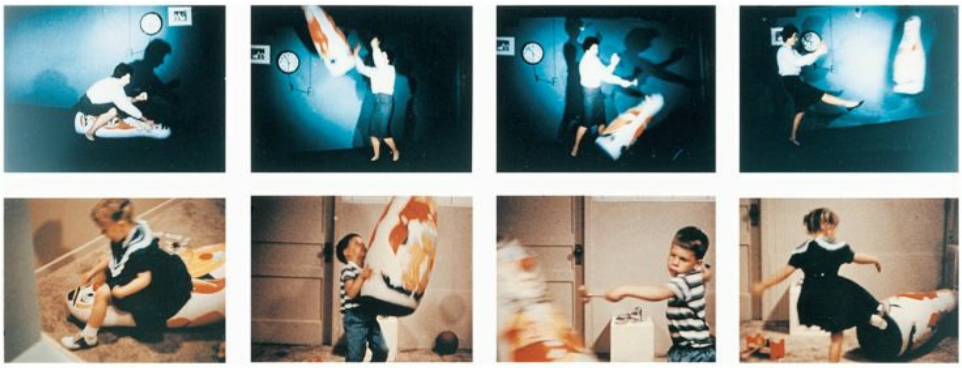


Figure 30.1

© Albert Bandura, Dept. of Psychology, Stanford University

Figure 30.1 The famous Bobo doll experiment

Notice how the children’s actions directly imitate the adult’s.

That “something more,” Bandura suggests, was this: By watching models, we experience *vicarious reinforcement* or *vicarious punishment,* and we learn to anticipate a behavior’s consequences in situations like those we are observing. We are especially likely to learn from people we perceive as similar to ourselves, as successful, or as admirable. Functional MRI (fMRI) scans show that when people observe someone winning a reward (and especially when it’s someone likable and similar to themselves), their own brain reward systems activate, much as if they themselves had won the reward (Mobbs et al., 2009). When we identify with someone, we experience their outcomes vicariously. Even our learned fears may extinguish as we observe another safely navigating the feared situation (Golkar et al., 2013). Lord Chesterfield (1694–1773) had the idea: “We are, in truth, more than half what we are by imitation.”

Bandura’s work provides an example of how basic research “pursued for its own sake” can have a broader purpose. “The Bobo Doll studies,” he reflected (2016), “provided the principles for unforeseen global applications 25 years later.” Insights derived from his research have not only been used to restrain televised violence, but also to offer social models that have helped reduce unplanned childbearing, protect against AIDS, and promote environmental conservation.

So, we learn by observation—but how do our brains do so?

Mirrors and Imitation in the Brain

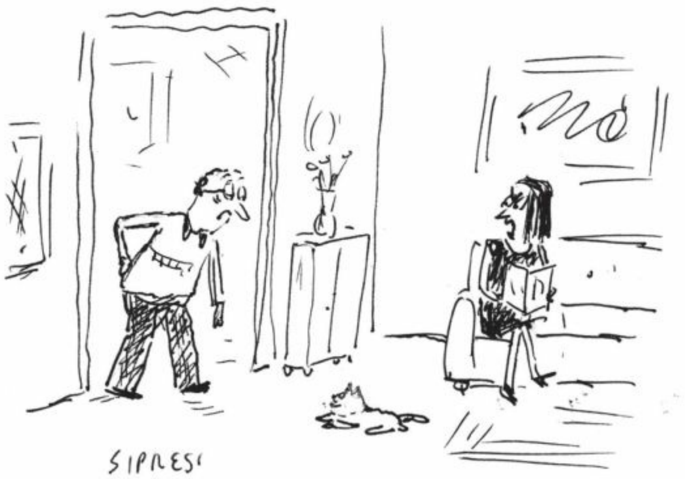
In 1991, on a hot summer day in Parma, Italy, a lab monkey awaited its researchers' return from lunch. The researchers had implanted wires next to its motor cortex, in a frontal lobe brain region that enabled the monkey to plan and enact movements. The monitoring device would alert the researchers to activity in that region of the monkey's brain. When the monkey moved a peanut into its mouth, for example, the device would buzz. That day, as one of the researchers reentered the lab, ice cream cone in hand, the monkey stared at him. As the researcher raised the cone to lick it, the monkey's monitor buzzed—as if the motionless monkey had itself moved (Blakeslee, 2006; Iacoboni, 2008, 2009).

The same buzzing had been heard earlier, when the monkey watched humans or other monkeys move peanuts to their mouths. The flabbergasted researchers, led by Giacomo Rizzolatti (2002, 2006), had, they believed, stumbled onto a previously unknown type of neuron. These presumed **mirror neurons**, they argued, provide a neural basis for everyday imitation and observational learning. When a monkey grasps, holds, or tears something, these neurons fire. And they likewise fire when the monkey observes another doing so. When one monkey sees, its neurons mirror what another monkey does. (For a debate regarding the importance of mirror neurons, which are sometimes overblown in the popular press, see Gallese et al., 2011; Hickok, 2014.)

mirror neurons

frontal lobe neurons that some scientists believe fire when we perform certain actions or observe another doing so. The brain's mirroring of another's action may enable imitation and empathy.

Imitation is widespread in other species. As Module 83 describes, chimpanzees observe and imitate all sorts of novel foraging and tool use behaviors, which are then transmitted from generation to generation within their local culture (Hopper et al., 2008; Whiten et al., 2007). In one 27-year analysis of 73,790 humpback whale observations, a single whale in 1980 whacked the water to drive prey fish into a clump. In the years since, this “lobtail” technique spread among other whales (Allen et al., 2013).



David Sipress

“Your back is killing me!”

Mirror neurons at work?

So, too, with monkeys. Erica van de Waal and her co-researchers (2013) trained groups of vervet monkeys to prefer either blue or pink corn by soaking one color in a disgusting-tasting solution. Four to six months later, after a new generation of monkeys was born, the adults stuck with whatever color they had learned to prefer—and, on observing them, so did all but one of 27 infant monkeys. Moreover, when blue- (or pink-) preferring males migrated to the other group, they switched preferences and began eating as the other group did. Monkey see, monkey do.

Left image: Masa Ushioda/AGE Fotostock; Right Image: Erica van de Waal

Animal social learning Whacking the water to boost feeding has spread among humpback whales through social learning (Allen et al., 2013). Likewise, monkeys learn to prefer whatever color corn they observe other monkeys eating.

In humans, imitation is pervasive. Our catchphrases, fashions, ceremonies, foods, traditions, morals, and fads all spread by one person copying another. Children and even infants are natural imitators (Marshall & Meltzoff, 2014). By 8 to 16 months, infants imitate various novel gestures (Jones, 2007). By 12 months (**Figure 30.2**), they look where an adult is looking (Meltzoff et al., 2009). And by 14 months, children imitate acts modeled on TV (Meltzoff, 1988; Meltzoff & Moore, 1989, 1997). Even as 2½-year-olds, when many of their mental abilities are near those of adult chimpanzees, young humans surpass chimps at social tasks such as imitating another’s solution to a problem (Herrmann et al., 2007). Children see, children do.

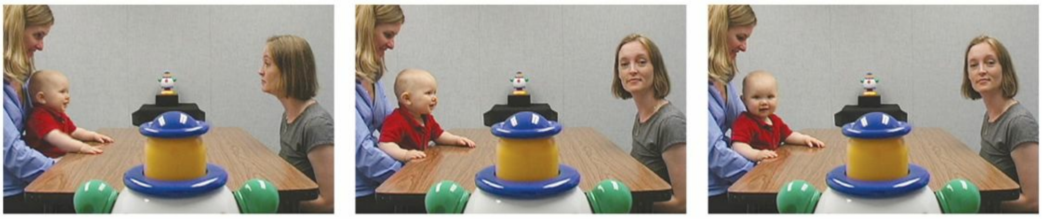


Figure 30.2
Meltzoff, A. N., Kuhl, P. K., Movellan, J. & Sejnowski, T. J. (2009). Foundations for a new science of learning. *Science, 325, 284–288.*

Figure 30.2 Imitation

This 12-month-old infant sees an adult look left, and immediately follows her gaze (Meltzoff et al., 2009).

> “*Children need models more than they need critics.*”
>
> *Joseph Joubert*, Pensées, *1842*

So strong is the human predisposition to learn from watching adults that 2- to 5-year-old children *overimitate*. Whether living in urban Australia or rural Africa, they copy even irrelevant adult actions. Before reaching for a toy in a plastic jar, they will first stroke the jar with a feather if that’s what they have observed (Lyons et al., 2007). Or, imitating an adult, they will wave a stick over a box and then use the stick to push on a knob that opens the box—when all they needed to do to open the box was to push on the knob (Nielsen & Tomaselli, 2010).

Humans, like monkeys, have brains that support empathy and imitation. Researchers cannot insert experimental electrodes in human brains, but they can use fMRI scans to see brain activity associated with performing and with observing actions. So, is the human capacity to simulate another's action and to share in another's experience due to specialized mirror neurons? Or is it due to distributed brain networks? That issue is under debate (Fox et al., 2016; Gallese et al., 2011; Hickok, 2014; Iacoboni, 2008, 2009; Spaulding, 2013). Regardless, children's brains do enable their empathy and their ability to infer another's mental state, an ability that Unit IX, Developmental Psychology, will call *theory of mind.*

Our brain's response to observing others makes emotions contagious. Our brain simulates and vicariously experiences what we observe. So real are these mental instant replays that we may misremember an action we have observed as one we have performed (Lindner et al., 2010). But through these reenactments, we grasp others' states of mind. Observing others' postures, faces, voices, and writing styles, we unconsciously synchronize our own to theirs—which helps us feel what they are feeling (Bernieri et al., 1994; Ireland & Pennebaker, 2010). Imitation helps us gain friends, leading us to mimic those we like (Chartrand & Lakin, 2013). We find ourselves yawning when they yawn, smiling when they smile, laughing when they laugh.

Seeing a loved one's pain, our faces mirror the other's emotion. But as **Figure 30.3** shows, so do our brains. In this fMRI scan, the pain imagined by an empathic romantic partner has triggered some of the same brain activity experienced by the loved one actually having the pain (Singer et al., 2004). Even fiction reading may trigger such activity, as we mentally simulate (and vicariously experience) the experiences described (Mar & Oatley, 2008; Speer et al., 2009). In one experiment, university students read (and vicariously experienced) a fictional fellow student's description of overcoming obstacles to vote. A week later, those who read the first-person account were more likely to vote in a presidential primary election

(Kaufman & Libby, 2012). In other studies, students who read *Harry Potter* (the bestselling kid wizard series that masterfully modeled tolerance), reported less prejudice against immigrants, refugees, and gay people (Vezzali et al., 2015).

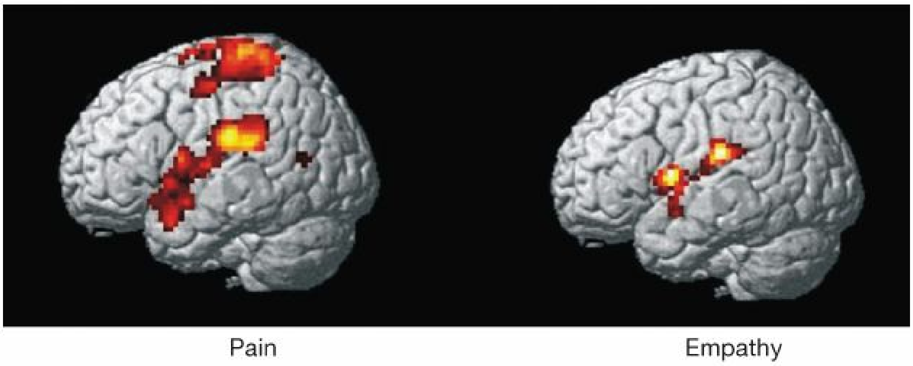


Figure 30.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Wellcome Department of Imaging Neuroscience/Science Source

Figure 30.3 Experienced and imagined pain in the brain

Brain activity related to actual pain (left) is mirrored in the brain of an observing loved one (right). Empathy in the brain shows up in emotional brain areas, but not in the somatosensory cortex, which receives the physical pain input.

Applications of Observational Learning

30-2 What is the impact of prosocial modeling and of antisocial modeling?

The big news from Bandura’s studies and mirror-neuron research is that we look, we mentally imitate, and we learn. Models—in our family, our neighborhood, or the media we consume—may have effects, good and bad.

Prosocial Effects

The good news is that people’s modeling of **prosocial** (positive, helpful) **behaviors** can have prosocial effects. Many business organizations effectively use *behavior modeling* to help new employees learn communications, sales, and customer service skills (Taylor et al., 2005). Trainees gain these skills faster when they are able to observe the skills being modeled effectively by experienced workers (or actors simulating them).

prosocial behavior

positive, constructive, helpful behavior. The opposite of antisocial behavior.

People who exemplify nonviolent, helpful behavior can also prompt similar behavior in others. After observing someone helping (assisting a woman with dropped books), people become more helpful, such as by assisting someone who dropped a dollar (Burger et al., 2015). India’s Mahatma Gandhi and America’s Martin Luther King, Jr., both drew on the power of modeling, making nonviolent action a powerful force for social change in both countries (Matsumoto et al., 2015). The media offer models. For example, one research team found that across seven countries, viewing prosocial TV, movies, and video games boosted later helping behavior (Prot et al., 2014).

Zumapress/Newscom

A model caregiver This girl is learning orphan-nursing skills, as well as compassion, by observing her mentor in this Humane Society program. As the sixteenth-century proverb states, “Example is better than precept.”

David Strickler/The Image Works

Children see, children do? Children who often experience physical punishment tend to display more aggression.

Parents are also powerful models. European Christians who risked their lives to rescue Jews from the Nazis usually had a close relationship with at least one parent who modeled a strong moral or humanitarian concern; this was also true for U.S. civil rights activists in the 1960s (London, 1970; Oliner & Oliner, 1988). The observational learning of morality begins early. Socially responsive toddlers who readily imitate their parents tend to become preschoolers with a strong internalized conscience (Forman et al., 2004).

Models are most effective when their actions and words are consistent. To encourage children to read, read to them and surround them with books and people who read. To increase the odds that your children will practice your religion, worship and attend religious activities with them. Sometimes, however, models say one thing and do another. Many parents seem to operate according to the principle “Do as I *say*, not as I do.” Experiments suggest that children learn to do both (Rice & Grusec, 1975; Rushton, 1975). Exposed to a hypocrite, they tend to imitate the hypocrisy —by doing what the model did and saying what the model said.

Antisocial Effects

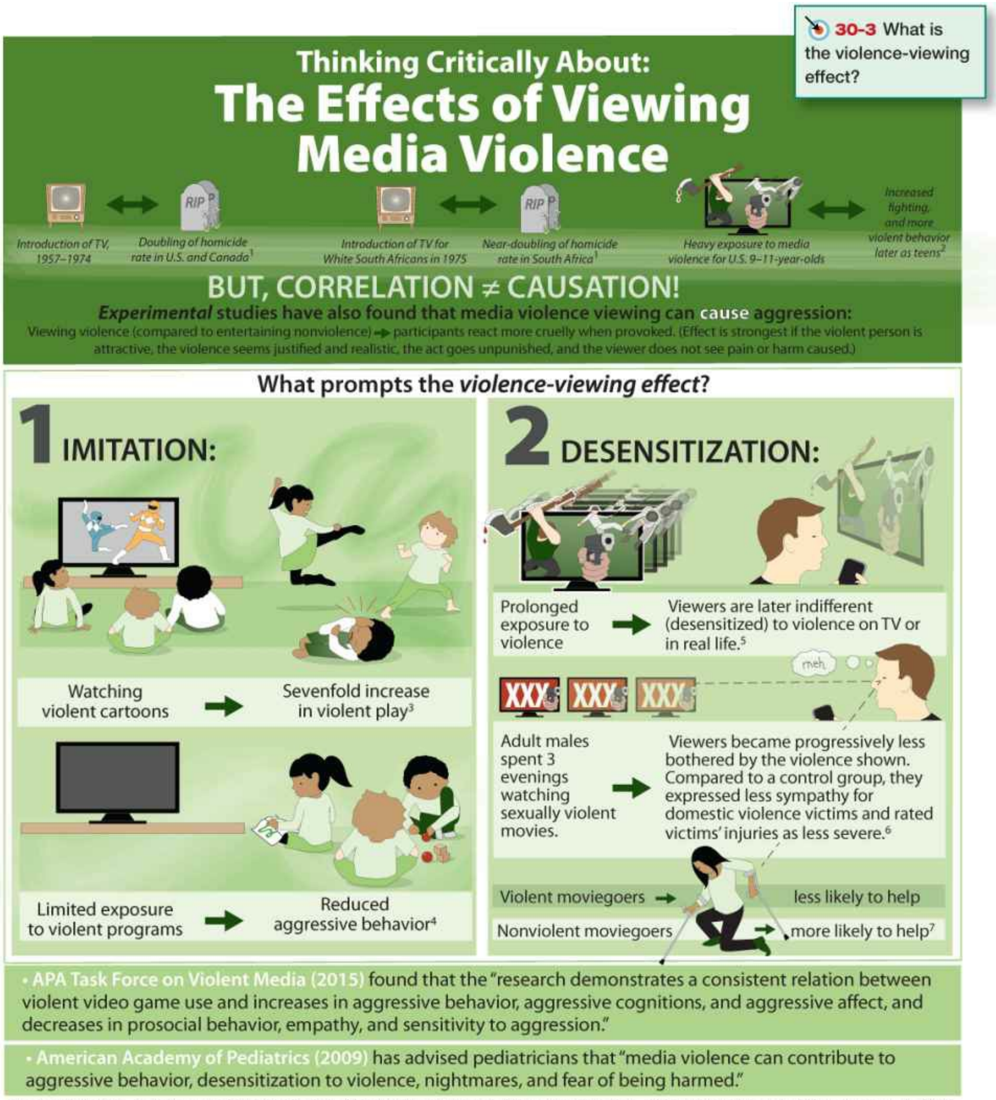
The bad news is that observational learning may also have *antisocial effects*. This helps us understand why abusive parents might have aggressive children, why children who are lied to become more likely to cheat and lie, and why many men who beat their wives had wife-battering fathers (Hays & Carver, 2014; Stith et al., 2000). Critics note that such aggressiveness could be genetic. But with monkeys, we know it can be environmental. In study after study, young monkeys separated from their mothers and subjected to high levels of aggression grew up to be aggressive themselves (Chamove, 1980). The lessons we learn as children are not easily replaced as adults, and they are sometimes visited on future generations.

TV shows, movies, and online videos are sources of observational learning. While watching, children may learn that bullying is an effective way to control others, that free and easy sex brings pleasure without later misery or disease, or that men should be tough and women gentle. And they have ample time to learn such lessons. During their first 18 years, most children in developed countries spend more time watching TV than they spend in school. The average teen watches more than 4 hours a day; the average adult, 3 hours (Robinson & Martin, 2009; Strasburger et al., 2010).

FYI

Screen time’s greatest effect may stem from what it displaces. Children and adults who spend several hours a day in front of a screen spend that many fewer hours in other pursuits—talking, studying, playing, reading, or socializing face-to-face with friends. What would you have done with your extra time if you had spent even half as many hours in front of a screen? How might you be different as a result?

Viewers are learning about life from a peculiar storyteller, one that reflects the culture’s mythology rather than its reality. Between 1998 and 2006, prime-time violence on TV reportedly increased 75 percent (PTC, 2007). An analysis of more than 3000 network and cable programs aired during one closely studied year revealed that nearly 6 in 10 featured violence, that 74 percent of the violence went unpunished, that 58 percent did not show the victims’ pain, that nearly half the incidents involved “justified” violence, and that nearly half involved an attractive perpetrator. These conditions define the recipe for the *violence-viewing effect* described in many studies and recognized by a near-consensus of media researchers (Bushman et al., 2015; Donnerstein, 1998, 2011). (See Thinking Critically About: The Effects of Viewing Media Violence.)



30-3 What is the violence-viewing effect?

Thinking Critically About:

The Effects of Viewing Media Violence

Introduction of TV, 1957–1974 ↔ *Doubling of homicide rate in U.S. and Canada*[1]

Introduction of TV for White South Africans in 1975 ↔ *Near-doubling of homicide rate in South Africa*[1]

Heavy exposure to media violence for U.S. 9–11-year-olds ↔ *Increased fighting, and more violent behavior later as teens*[2]

BUT, CORRELATION ≠ CAUSATION!

***Experimental* studies have also found that media violence viewing can cause aggression:**

Viewing violence (compared to entertaining nonviolence) → participants react more cruelly when provoked. (Effect is strongest if the violent person is attractive, the violence seems justified and realistic, the act goes unpunished, and the viewer does not see pain or harm caused.)

What prompts the *violence-viewing effect*?

1 IMITATION:

Watching violent cartoons → Sevenfold increase in violent play[3]

Limited exposure to violent programs → Reduced aggressive behavior[4]

2 DESENSITIZATION:

Prolonged exposure to violence → Viewers are later indifferent (desensitized) to violence on TV or in real life.[5]

Adult males spent 3 evenings watching sexually violent movies. → Viewers became progressively less bothered by the violence shown. Compared to a control group, they expressed less sympathy for domestic violence victims and rated victims' injuries as less severe.[6]

Violent moviegoers → less likely to help

Nonviolent moviegoers → more likely to help[7]

- **APA Task Force on Violent Media (2015)** found that the "research demonstrates a consistent relation between violent video game use and increases in aggressive behavior, aggressive cognitions, and aggressive affect, and decreases in prosocial behavior, empathy, and sensitivity to aggression."

- **American Academy of Pediatrics (2009)** has advised pediatricians that "media violence can contribute to aggressive behavior, desensitization to violence, nightmares, and fear of being harmed."

1. Centerwall, 1989. 2. Boxer at al., 2009; Gentile et al., 2011; Gentile & Bushman, 2012. 3. Boyatzis et al., 1995. 4. Christakis et al., 2013. 5. Fanti et al., 2009; Rule & Ferguson, 1986. 6. Mullin & Linz, 1995. 7. Bushman & Anderson, 2009.

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In 2012, a well-armed man targeted young children and their teachers in a horrifying mass shooting at Connecticut's Sandy Hook Elementary School. Was the American media correct in wondering whether the killer was influenced by the violent video games found stockpiled in his home?

* * *

> “*Thirty seconds worth of glorification of a soap bar sells soap. Twenty-five minutes worth of glorification of violence sells violence.*”
>
> *U.S. Senator Paul Simon, Remarks to the Communitarian Network, 1993*

Our knowledge of learning principles comes from the work of hundreds of investigators. This unit has focused on the ideas of a few pioneers—Ivan Pavlov, John Watson, B. F. Skinner, and Albert Bandura. They illustrate the impact that can result from single-minded devotion to a few well-defined problems and ideas. These researchers defined the issues and impressed on us the importance of learning. As their legacy demonstrates, intellectual history is often made by people who risk going to extremes in pushing ideas to their limits (Simonton, 2000).

✓ Check Your Understanding

Ask Yourself

- Who has been a significant role model for you? For whom are you a model?

Test Yourself

- Jason’s parents and older friends all drive over the speed limit, but they advise him not to. Juan’s parents and friends drive within the speed limit, but they say nothing to deter him from speeding. Will Jason or Juan be more likely to speed?
- Match the examples (1–5) to the appropriate underlying learning principle (a–e):

  a. Classical conditioning
  b. Operant conditioning
  c. Latent learning
  d. Observational learning
  e. Biological predispositions

  1. Knowing the way from your bed to the bathroom in the dark
  2. Your little brother getting in a fight after watching a violent action movie
  3. Salivating when you smell brownies in the oven
  4. Disliking the taste of chili after becoming violently sick a few hours after eating chili
  5. Your dog racing to greet you on your arrival home

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 30 REVIEW

30-1 How does observational learning differ from associative learning, and how may observational learning be enabled by neural mirroring?

- *Observational learning,* as shown in Bandura’s Bobo doll experiment, involves learning by watching and imitating, rather than learning associations between different events. We learn to anticipate a behavior’s consequences, because we experience vicarious reinforcement or vicarious punishment.
- Our brain’s frontal lobes have a demonstrated ability to mirror the activity of another’s brain. The same areas fire when we perform certain actions (such as responding to pain or moving our mouth to form words), as when we observe someone else performing those actions. Some psychologists believe *mirror neurons* enable this process. (Others argue it may be more due to the brain’s distributed brain networks.)

30-2 What is the impact of prosocial modeling and of antisocial modeling?

- Children tend to imitate what a model does and says, whether the behavior being *modeled* is *prosocial* (positive, constructive, and helpful) or antisocial.
- If a model’s actions and words are inconsistent, children may imitate the hypocrisy they observe.

30-3 What is the violence-viewing effect?

- Media violence can contribute to aggression. This violence-viewing effect may be prompted by imitation and desensitization.
- Experimental studies have shown that participants react more

aggressively and with less compassion when they have viewed violence (instead of entertaining nonviolence).

Multiple-Choice Questions

1. Bandura's famous Bobo doll experiment is most closely associated with which of the following?

a. Latent learning
b. Classical conditioning
c. Operant conditioning
d. Cognitive maps
e. Observational learning

2. Which of the following processes is the best term for explaining how we learn languages?

a. Biofeedback
b. Discrimination
c. Modeling
d. Insight
e. Creativity

3. Which of the following is the most likely consequence of the brain's tendency to vicariously experience something we observe?

a. Actual physical injury
b. The risk of misremembering our own actions
c. Interference with associative learning
d. The elimination of classically conditioned responses to stimuli
e. A confusion between reinforcers and rewards in an operant conditioning setting

4. When is prosocial modeling most effective?

a. When the model acts in a way consistent with the prosocial lesson
b. When the model verbally emphasizes the prosocial lesson but acts as she chooses
c. When the model is predisposed to the prosocial conduct

d. When the observer has a close personal relationship with the model
e. When the model is well-known

5. After observing his sibling walk across a balance beam, Joe’s brain reacts in a way that will enable him to imitate the action later. Which part of his brain may be responsible for this?

a. Reward system
b. Somatosensory cortex
c. Mirror neurons
d. Motor cortex
e. Aggression areas

Practice FRQs

1. Explain how Bandura’s Bobo doll experiment illustrates each of the following.

- Modeling
- Antisocial modeling

Answer

1 point: Modeling can be described as observing and imitating a specific behavior. In Bandura’s study, the children replicated the behaviors they witnessed the adult perform. Page 312

1 point: Antisocial modeling occurs when a person models behaviors that are not positive, constructive, or helpful. In Bandura’s study, the children were replicating these kinds of antisocial behaviors (hitting, kicking, throwing), which they had seen the adult display. Page 316

2. A young boy is left at home with his older brother while their parents drop off the family car for repairs. While the parents are out, the older brother prepares lunch for the young boy. Then the older brother takes the younger brother outside, where he entertains him by building several fires with small twigs. Explain how the older brother’s conduct is related to:

- Prosocial modeling
- Mirror neurons

(2 points)

UNIT VI REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

learning, p. 270
habituation, p. 271
associative learning, p. 271
stimulus, p. 271
respondent behavior, p. 271
operant behavior, p. 271
cognitive learning, p. 272
classical conditioning, p. 272
behaviorism, p. 272
neutral stimulus (NS), p. 273
unconditioned response (UR), p. 274
unconditioned stimulus (US), p. 274
conditioned response (CR), p. 274
conditioned stimulus (CS), p. 274
acquisition, p. 275
higher-order conditioning, p. 276
extinction, p. 276
spontaneous recovery, p. 276
generalization, p. 276
discrimination, p. 277
operant conditioning, p. 283
law of effect, p. 283
operant chamber, p. 284
reinforcement, p. 284
shaping, p. 284
discriminative stimulus, p. 285

positive reinforcement, p. 285

negative reinforcement, p. 285

primary reinforcer, p. 286

conditioned reinforcer, p. 286

reinforcement schedule, p. 287

continuous reinforcement schedule, p. 287

partial (intermittent) reinforcement schedule, p. 287

fixed-ratio schedule, p. 288

variable-ratio schedule, p. 288

fixed-interval schedule, p. 288

variable-interval schedule, p. 288

punishment, p. 289

biofeedback, p. 296

preparedness, p. 300

instinctive drift, p. 303

cognitive map, p. 304

latent learning, p. 304

insight, p. 304

intrinsic motivation, p. 305

extrinsic motivation, p. 305

problem-focused coping, p. 306

emotion-focused coping, p. 306

personal control, p. 306

learned helplessness, p. 307

external locus of control, p. 309

internal locus of control, p. 309

self-control, p. 309

observational learning, p. 312

modeling, p. 312

mirror neurons, p. 313

prosocial behavior, p. 315

KEY CONTRIBUTORS TO REMEMBER

Ivan Pavlov, p. 272

John B. Watson, p. 272

B. F. Skinner, p. 283

Edward L. Thorndike, p. 283

John Garcia, p. 301

Robert Rescorla, p. 303

Edward C. Tolman, p. 304

Albert Bandura, p. 312

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. Which of the following most accurately describes an impact of punishment?

a. Punishment is a good way to increase a behavior, as long as it is not used too frequently.
b. Punishment may create problems in the short term but rarely produces long-term side effects.
c. Punishment can be effective at stopping specific behaviors quickly.
d. Punishment typically results in an increase of a behavior caused by the removal of an aversive stimulus.
e. Punishment should never be used (in the opinion of most psychologists), because the damage it causes can never be repaired.

2. Which of the following is an application of shaping?

a. A mother who wants her daughter to hit a baseball first praises her for holding a bat, then for swinging it, and then for hitting the ball.
b. A pigeon pecks a disk 25 times for an opportunity to receive a food reinforcement.
c. A rat presses a bar when a green light is on but not when a red light is on.

d. A rat gradually stops pressing a bar when it no longer receives a food reinforcement.
e. A gambler continues to play a slot machine, even though he has won nothing on his last 20 plays, and he has lost a significant amount of money.

3. What is one of the principal functions of mirror neurons?

a. To allow an organism to replace an unconditioned response with a conditioned response
b. To help produce intrinsic motivation in some children
c. To be the mechanism by which the brain accomplishes observational learning
d. To allow an organism to react differently to various schedules of reinforcement
e. To explain why modeling prosocial behavior is more effective than modeling antisocial behavior

4. Which of the following illustrates generalization?

a. A rabbit that has been conditioned to blink to a tone also blinks when a different tone is sounded.
b. A dog salivates to a tone but not to a buzzer.
c. A light is turned on repeatedly until a rat stops flexing its paw when it’s turned on.
d. A pigeon whose disk-pecking response has been extinguished is placed in a Skinner box three hours later and begins pecking the disk again.
e. A child is startled when the doorbell rings.

5. What did Albert Bandura’s Bobo doll experiments demonstrate?

a. Children are likely to imitate the behavior of adults.
b. There may be a negative correlation between televised violence and aggressive behavior.
c. Children are more likely to copy what adults say than what adults do.

d. Allowing children to watch too much television is detrimental to their development.
e. Observational learning can explain the development of fears in children.

6. What did Robert Rescorla and Allan Wagner's experiments establish?

a. That the acquisition of a CR depends on pairing the CS and the US
b. That different species respond differently to classical conditioning situations
c. The current belief that classical conditioning is really a form of operant conditioning
d. That mirror neurons form the biological basis of classical conditioning
e. The importance of cognitive factors in classical conditioning

7. Which of the following best demonstrates the law of effect?

a. Tommy keeps asking Josie to the prom even though she has said no several times.
b. Gloria refuses to make her bed and is grounded.
c. A dog whines at the door and is let out so later she whines again.
d. A baseball player drops a ball and is cut from the team.
e. A dancer chooses a costume based on what her friends are wearing.

8. Which of the following processes would produce the acquisition of a conditioned response?

a. Repeatedly present an unconditioned response.
b. Administer the conditioned stimulus without the unconditioned stimulus.
c. Make sure that the conditioned stimulus comes at least one minute before the unconditioned stimulus.
d. Pair a neutral stimulus with an unconditioned stimulus several times.
e. Present the conditioned stimulus until it starts to produce an unconditioned response.

9. An organism responds to a 10-Hz tone but not to a 25-Hz tone, demonstrating the concept of

a. generalization.
b. a variable-ratio schedule of reinforcement.
c. a fixed-ratio schedule of reinforcement.
d. discrimination.
e. positive reinforcement.

0. A student studies diligently to avoid the bad feelings associated with a previously low grade on a test. In this case, the studying behavior is being strengthened because of what kind of reinforcement?

a. Positive reinforcement
b. Negative reinforcement
c. Delayed reinforcement
d. Primary reinforcement
e. Conditioned reinforcement

1. Taste aversion studies lead researchers to which of the following conclusions?

a. Taste is the most fundamental of the senses.
b. Animals must watch another animal have a taste reaction before they exhibit the aversion.
c. Animals must evaluate a situation cognitively before taste aversion develops.
d. Taste aversion is a universal survival mechanism.
e. A US must occur within seconds of a CS for conditioning to occur.

2. Mary checks her phone every 30 minutes for incoming text messages, but she finds messages only some of the time. Her behavior is being maintained by what kind of reinforcement schedule?

a. Fixed-interval
b. Variable-interval
c. Variable-ratio
d. Fixed-ratio
e. Continuous

3. After being conditioned to salivate to the sound of a tone that had been paired with food, a dog stops salivating when the tone is repeatedly presented without the food. After a few weeks, the dog hears the tone and starts salivating again. Which of the following best explains the dogs renewed salivation?

a. Spontaneous recovery
b. Extinction
c. Generalization
d. Discrimination
e. Acquisition

4. Latent learning is evidence for which of these conclusions?

a. Punishment is an ineffective means of controlling behavior.
b. Negative reinforcement should be avoided when possible.
c. Cognition plays an important role in operant conditioning.
d. Conditioned reinforcers are more effective than primary reinforcers.
e. Shaping is usually not necessary for operant conditioning.

5. Classical and operant conditioning are based on the principles of which psychological perspective?

a. Cognitive
b. Biological
c. Behavioral
d. Evolutionary
e. Humanistic

6. Jazz is determined to quit drinking and enters a therapy program. The program places a nausea-inducing drug into each drink she takes. After a few weeks, the sight or thought of a drink makes Jazz sick. Her sickness as a result of the drug is a(n)

a. US.
b. UR.
c. NS.
d. CS.

    e. CR.

7. Review the scenario in Question 16. The drug that makes her sick is a(n)

    a. US.
    b. UR.
    c. NS.
    d. CS.
    e. CR.

8. An employee at a shoe store is paid $10 for each pair that he sells. If he does not sell any shoes, he does not get paid. His paycheck is based on which of the following schedules of reinforcement?

    a. Variable ratio
    b. Fixed interval
    c. Fixed ratio
    d. Variable interval
    e. Spontaneous

9. An employee at the store next door gets paid every Friday, no matter how many pairs of shoes she sells. Her paycheck is based on which of the following schedules of reinforcement?

    a. Variable ratio
    b. Fixed interval
    c. Fixed ratio
    d. Variable interval
    e. Spontaneous

0. Which of the following statements is true?

    a. Positive punishment continues a behavior; negative punishment discontinues a behavior.
    b. Positive reinforcement continues a behavior; negative reinforcement discontinues a behavior.
    c. Positive punishment discontinues a behavior; negative punishment

continues a behavior.

d. Positive punishment continues a behavior; positive reinforcement continues a behavior.
e. Positive reinforcement continues a behavior; negative reinforcement continues a behavior.

Free-Response Questions

1. Briefly explain how the concepts below could be used to help a child stop throwing temper tantrums.

- Extinction (operant conditioning)
- Positive reinforcement
- Modeling
- Negative reinforcement
- Shaping
- Extinction (classical conditioning)

Rubric for Free Response Question 1

1 point: **Extinction (operant conditioning)** The child might be throwing a temper tantrum because that behavior is being reinforced (for example, it gains desired attention from a parent). Extinction could be used to stop the temper tantrum by removing the reinforcement. Without the reinforcement, eventually the behavior (tantrums) should decrease. ↩ Page 297

1 point: **Positive reinforcement** A positive reinforcer (such as reading a favorite book) could be used to encourage a behavior other than temper tantrums. The child could be given the positive reinforcement after a prosocial behavior, such as sharing a toy with a friend instead of throwing a tantrum. ↩ Pages 285–287

1 point: **Modeling** The child might learn to avoid temper tantrums through modeling or observational learning. A parent or other adult could show positive behaviors when disappointed, and the child might imitate this behavior. ↩ Pages 315–318

1 point: **Negative reinforcement** Negative reinforcement occurs when an aversive stimulus is removed, and this removal reinforces an aversive behavior. In this situation, a parent or adult could sit the child on a “time-out” seat as soon as the temper tantrum begins. The child could leave the time out seat as soon as she or he stops crying. Release from the time out seat could reinforce not crying, and help to stop the temper tantrums. Pages 285–287

1 point: **Shaping** A parent or other adult could gradually shape the child’s negative behavior toward desired behaviors by rewarding successive approximations. For example, a child could first be rewarded for crying more quietly during a tantrum, then for stopping yelling, then for avoiding the tantrum completely. Pages 284–285

1 point: **Extinction (classical conditioning)** In the context of classical conditioning, a behavior becomes extinct because a neutral stimulus is repeatedly presented without the unconditioned stimulus. For example, a child might have been classically conditioned to throw a tantrum whenever the child’s brother was present, because the brother always pinched the child. The tantrums could be made extinct by convincing the brother to stop the pinching. The conditioned stimulus (the brother) is presented to the child without the unconditioned stimulus (the pinching). After repeated pairings, the conditioned response of the tantrum should become extinct. Page 276

2. Martin is a sixth-grade teacher who feels he is not able to connect with some of his students. Several of them have had academic problems in the past and although Martin feels that they can do the work, he believes that these students have given up. Explain how Martin could use each of these concepts to learn how best to help his students succeed.

   - External locus of control
   - Self-control
   - Learned helplessness
   - Intrinsic motivation

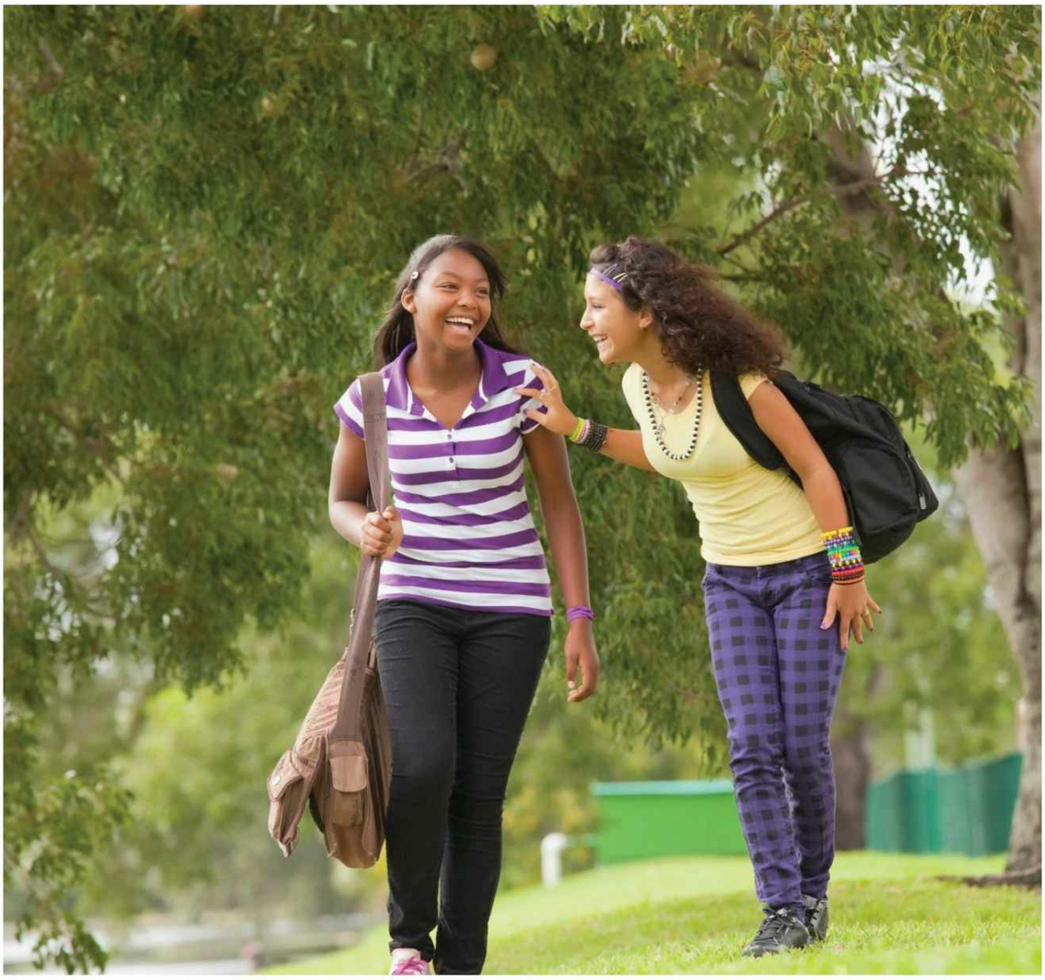
(4 points)

3. Researchers investigating conditioning throughout the history of psychology reached very different conclusions about how humans learn behaviors. Explain how these theorists might explain this example of behavior and response: A child cries when she sees a large pile of peas on her dinner plate.

- Edward L. Thorndike
- B. F. Skinner
- Ivan Pavlov
- Albert Bandura

(4 points)

UNIT **VII Cognition**



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MODULES

31 Studying and Encoding Memories

32 Storing and Retrieving Memories

33 Forgetting, Memory Construction, and Improving Memory

34 Thinking, Concepts, and Creativity

35 Solving Problems and Making Decisions

36 Thinking and Language

Throughout history, we humans have both bemoaned our foolishness and celebrated our wisdom. The poet T. S. Eliot was struck by “the hollow men . . . Headpiece filled with straw.” But Shakespeare’s Hamlet extolled the human species as “noble in reason! . . . infinite in faculties! . . . in apprehension how like a god!” In the preceding units, we have likewise marveled at both our abilities and our errors.

Earlier in this text, we studied the human brain—three pounds of wet tissue the size of a small cabbage, yet containing circuitry more complex than the planet’s telephone networks. We appreciated the amazing abilities of newborns. We marveled at our sensory system, translating visual stimuli into nerve impulses, distributing them for parallel processing, and reassembling them into colorful perceptions. Little wonder that our species has had the collective genius to invent the camera, the car, and the computer; to unlock the atom and crack the genetic code; to travel out to space and into our brain’s depths.

Yet we have also seen that our species is related to the other animals, influenced by the same principles that produce learning in rats and pigeons. We have noted that we not-so-wise humans are easily deceived by perceptual illusions, pseudopsychic claims, and hypnosis-induced false memories.

In this unit, we encounter further instances of these two images of the human condition—the rational and the irrational. We will ponder our memory’s enormous capacity, and the ease with which our two-track mind processes information, with and without our awareness. We will consider how we use and misuse the information we receive, perceive, store, and retrieve. We will look at our gift for language and consider how and why it develops. And we will reflect on how deserving we are of our species name, *Homo sapiens*—wise human.

▶ **Unit VII Overview Video**

Module **31 Studying and Encoding Memories**

LEARNING TARGETS

- 31-1 Define *memory*, and explain how memory is measured.
- 31-2 Discuss how psychologists describe the human memory system.
- 31-3 Describe the differences between explicit and implicit memories.
- 31-4 Discuss the information we process automatically.
- 31-5 Explain how sensory memory works.
- 31-6 Describe our short-term and working memory capacity.
- 31-7 Describe the effortful processing strategies that help us remember new information.
- 31-8 Discuss the levels of processing and their effect on encoding.

Be thankful for memory. We take it for granted, except when it malfunctions. But it is our memory that accounts for time and defines our life. It is our memory that enables us to recognize family, speak our language, and find our way home. It is our memory that enables us to enjoy an experience and then mentally replay and enjoy it again. It is our memory that enables us to build histories with those we love. And it is our memory that occasionally pits us against those whose offenses we cannot forget. Our shared memories help bind us together as Irish or Icelandic, Serbian or Samoan.

In large part, we are what we remember. Without memory—our storehouse of accumulated learning—there would be no savoring of past joys, no guilt or anger over painful recollections. We would instead live in an enduring present, each moment fresh. Each person would be a stranger, every language foreign, every task—dressing, eating, biking—a new challenge. You would even be a stranger to yourself, lacking that continuous sense of self that extends from your distant past to your momentary present.

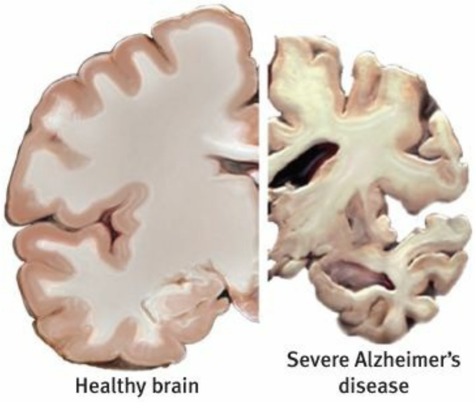
Studying Memory

31-1 What is *memory*, and how is it measured?

Memory is learning that persists over time; it is information that has been acquired and stored and can be retrieved. Research on memory's extremes has helped us understand how memory works. At age 92, my [DM's] father suffered a small stroke that had but one peculiar effect. He was as mobile as before. His genial personality was intact. He knew us and enjoyed poring over family photo albums and reminiscing about his past. But he had lost most of his ability to lay down new memories of conversations and everyday episodes. He could not tell me what day of the week it was, or what he'd had for lunch. Told repeatedly of his brother-in-law's recent death, he was surprised and saddened each time he heard the news.

memory

the persistence of learning over time through the encoding, storage, and retrieval of information.



National Institute on Aging, National Institutes of Health

Extreme forgetting Alzheimer's disease severely damages the brain, and in the process, strips away memory.

Some disorders slowly strip away memory. *Alzheimer's disease* begins as difficulty remembering new information and progresses into an inability to do everyday tasks. Family members and close friends become strangers; complex speech devolves to simple sentences; the brain’s memory centers weaken and wither (Desikan et al., 2009). Over several years, someone with Alzheimer’s may become unknowing and unknowable. Lost memory strikes at the core of our humanity, leaving people robbed of a sense of joy, meaning, and companionship. (Without your memory, would you be you?)

At the other extreme are people who would win gold medals in a memory Olympics. Russian journalist Solomon Shereshevskii, or S, had merely to listen while other reporters scribbled notes (Luria, 1968). The average person could repeat back a string of about 7—maybe even 9—digits. S could repeat up to 70, if they were read about 3 seconds apart in an otherwise silent room. Moreover, he could recall digits or words backward as easily as forward. His accuracy was unerring, even when recalling a list 15 years later. “Yes, yes,” he might recall. “This was a series you gave me once when we were in your apartment. . . . You were sitting at the table and I in the rocking chair. . . . You were wearing a gray suit. . . .”

AP® EXAM TIP

The next three modules deal with memory. Not only is this a significant topic on the AP® exam, but it is also, for students, one of psychology’s most practical topics! As you read, think about how you can apply what you’re learning about encoding, storing, and retrieving information—and become a better student.

Amazing? Yes, but consider your own impressive memory. You remember countless faces, places, and happenings; tastes, smells, and textures; voices, sounds, and songs. In one study, students listened to snippets—a mere four-tenths of a second—from popular songs. How often did they recognize the artist and song? More than 25 percent of the time (Krumhansl, 2010). We often recognize songs as quickly as we recognize a familiar voice.

> “*If any one faculty of our nature may be called more wonderful than the rest, I do think it is memory.*”
>
> *Jane Austen*, Mansfield Park, *1814*

So, too, with faces and places. Imagine viewing more than 2500 slides of faces and places for 10 seconds each. Later, you see 280 of these slides, paired with others you’ve never seen. Actual participants in this experiment recognized 90 percent of the slides they had viewed in the first round (Haber, 1970). In a follow-up experiment, people exposed to 2800 images for only 3 seconds each spotted the repeats with 82 percent accuracy (Konkle et al., 2010). Look for a target face in a sea of faces and you later will recognize other faces from the scene as well (Kaunitz et al., 2016). Some super-recognizers display an extraordinary ability to recognize faces. Eighteen months after viewing a video of an armed robbery, one such police officer spotted and arrested the robber walking on a busy street (Davis et al., 2013). And it’s not just humans who have shown remarkable memory for faces. Sheep can learn to remember faces (**Figure 31.1**). And so can at least one fish species—as demonstrated by their spitting at familiar faces to trigger a food reward (Newport et al., 2016).

Figure 31.1
Eric Isselee/Shutterstock

Figure 31.1 Other animals also display face smarts

After food rewards are repeatedly associated with some sheep faces, but not with others, sheep remember the food-associated faces for two years (Kendrick & Feng, 2011).

How do we humans accomplish such memory feats? How does our brain pluck information out of the world around us and tuck it away for later use? How can we remember things we have not thought about for years, yet forget the name of someone we just met? How are memories stored in our brain? Why will you be likely, later in this module, to misrecall this sentence: “*The angry rioter threw the rock at the window*”? In this and the next two modules, we’ll consider these fascinating questions and more.

Measuring Retention

To a psychologist, evidence that learning persists includes these three retention *measures:*

- **recall**—*retrieving* information that is not currently in your conscious awareness but that was learned at an earlier time. A fill-in-the-blank question tests your recall.
- **recognition**—*identifying* items previously learned. A multiple-choice question tests your recognition.
- **relearning**—*learning something more quickly* when you learn it a second or later time. When you study for a final exam or engage a language used in early childhood, you will relearn the material more easily than you did initially.

recall

a measure of memory in which the person must retrieve information learned earlier, as on a fill-in-the-blank test.

recognition

a measure of memory in which the person identifies items previously learned, as on a multiple-choice test.

relearning

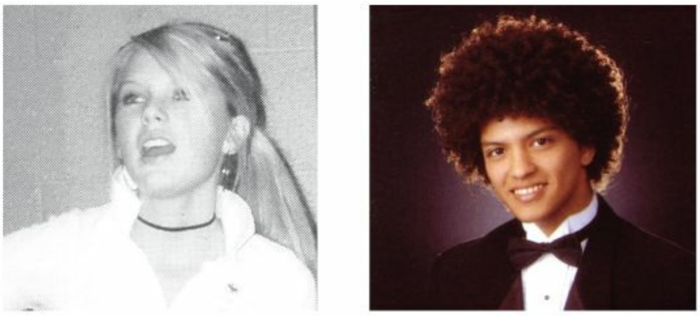
a measure of memory that assesses the amount of time saved when learning material again.

Long after you cannot recall most of the people in your high school graduating class, you may still be able to recognize their yearbook pictures and spot their names in a list of names. In one experiment, people who had graduated 25 years earlier could not recall many of their old classmates. But they could *recognize* 90 percent of their pictures and names (Bahrick et al., 1975). If you are like most students, you, too, could probably recognize more names of Snow White's seven dwarfs than you could recall (Miserandino, 1991).

Our recognition memory is impressively quick and vast. "Is your friend wearing a new or old outfit?" "Old." "Is this five-second movie clip from a film you've ever seen?" "Yes." "Have you ever seen this person before—this minor variation on the same old human features (two eyes, one nose, and so on)?" "No." Before the mouth can form our answer to any of millions of such questions, the mind knows, and knows that it knows.

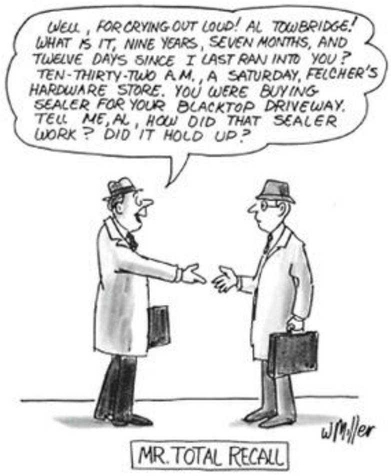
Our response speed when recalling or recognizing information indicates memory strength, as does our speed at *relearning*. Pioneering memory researcher Hermann Ebbinghaus (1850–1909) showed this over a century ago, using nonsense syllables. He randomly selected a sample of syllables, practiced them, and tested himself. To get a feel for his experiments, rapidly read aloud, eight times over, the following list (from Baddeley, 1982), then look away and try to recall the items:

> JIH, BAZ, FUB, YOX, SUJ, XIR, DAX, LEQ, VUM, PID, KEL, WAV, TUV, ZOF, GEK, HIW.



Left: National News/ZUMAPRESS.com/Newscom; Right: Seth Poppel Yearbook Library

Remembering things past Even if Taylor Swift and Bruno Mars had not become famous, their high school classmates would most likely still recognize them in these photos.


WELL, FOR CRYING OUT LOUD! AL TOWBRIDGE! WHAT IS IT, NINE YEARS, SEVEN MONTHS, AND TWELVE DAYS SINCE I LAST RAN INTO YOU? TEN-THIRTY-TWO A.M., A SATURDAY, FELCHER'S HARDWARE STORE. YOU WERE BUYING SEALER FOR YOUR BLACKTOP DRIVEWAY. TELL ME, AL, HOW DID THAT SEALER WORK? DID IT HOLD UP?
wMiller
MR. TOTAL RECALL

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Warren Miller from cartoonbank.com.
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The day after learning such a list, Ebbinghaus could recall few of the syllables. But they weren't entirely forgotten. As **Figure 31.2** portrays, the more frequently he repeated the list aloud on Day 1, the less time he required to relearn the list on Day 2. Additional rehearsal of verbal information can produce *overlearning*, which increases retention—especially when practice is distributed over time. For students, this means that it helps to rehearse course material even after you know it.

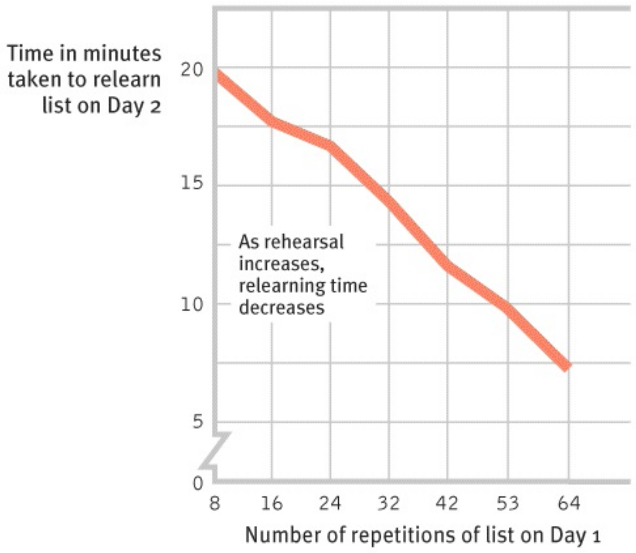

Figure 31.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Baddeley, 1982.

Figure 31.2 Ebbinghaus' retention curve

Ebbinghaus found that the more times he practiced a list of nonsense syllables on Day 1, the less time he required to relearn it on Day 2. Speed of relearning is one measure of memory retention.

The point to remember: Tests of recognition and of time spent relearning demonstrate that we remember more than we can recall.

✓ Check Your Understanding

Ask Yourself

- Imagine having a disease that significantly impaired your memory. Now, imagine having a record-setting ability to remember, like Russian journalist Solomon Shereshevskii. How would each affect your daily routine?

Test Yourself

- Multiple-choice questions test our _______________. Fill-in-the-blank questions test our _______________.
- If you want to be sure to remember what you're learning for an upcoming test, would it be better to use *recall* or *recognition* to check your memory? Why?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Memory Models

31-2 How do psychologists describe the human memory system?

Architects make virtual house models to help clients imagine their future homes. Similarly, psychologists create memory models that, even if imperfect, are useful. Such models help us think about how our brain forms and retrieves memories. An *information-processing model* likens human memory to computer operations. Thus, to remember any event, we must

- get information into our brain, a process called **encoding**.
- retain that information, a process called **storage**.
- later get the information back out, a process called **retrieval**.

encoding

the process of getting information into the memory system—for example, by extracting meaning.

storage

the process of retaining encoded information over time.

retrieval

the process of getting information out of memory storage.

Like all analogies, computer models have their limits. Our memories are less literal and more fragile than a computer’s. Most computers also process information sequentially, even while alternating between tasks. Our agile brain processes many things simultaneously (some of them unconsciously) by means of **parallel processing**. To focus on this multitrack processing, one information-processing model, *connectionism*, views memories as products of interconnected neural networks. Specific memories arise from particular activation patterns within these networks. Every time you learn something new, your brain's neural connections change, forming and strengthening pathways that allow you to interact with and learn from your constantly changing environment.

parallel processing

processing many aspects of a problem simultaneously; the brain's natural mode of information processing for many functions.

To explain our memory-forming process, Richard Atkinson and Richard Shiffrin (1968, 2016) proposed a three-stage model:

1. We first record to-be-remembered information as a fleeting **sensory memory**.
2. From there, we process information into **short-term memory**, where we encode it through *rehearsal*.
3. Finally, information moves into **long-term memory** for later retrieval.

sensory memory

the immediate, very brief recording of sensory information in the memory system.

short-term memory

activated memory that holds a few items briefly, such as digits of a phone number while calling, before the information is stored or forgotten.

long-term memory

the relatively permanent and limitless storehouse of the memory system. Includes knowledge, skills, and experiences.

This model has since been updated (**Figure 31.3**) with important newer concepts, including *working memory* and *automatic processing*.

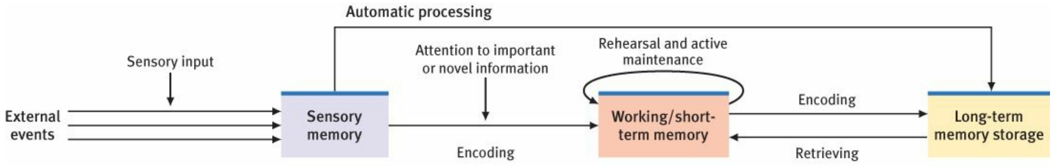
Automatic processing
Sensory input
External events
Sensory memory
Attention to important or novel information
Encoding
Rehearsal and active maintenance
Working/short-term memory
Encoding
Retrieving
Long-term memory storage

Figure 31.3

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Figure 31.3 A modified three-stage processing model of memory

Atkinson and Shiffrin's classic three-step model helps us to think about how memories are processed, but today's researchers recognize other ways long-term memories form. For example, some information slips into long-term memory via a "back door," without our consciously attending to it *(automatic processing).* And so much active processing occurs in the short-term memory stage that many now prefer the term *working memory.*

Working Memory

Alan Baddeley and others (Baddeley, 2002; Barrouillet et al., 2011; Engle, 2002) extended Atkinson and Shiffrin's initial view of short-term memory as a space for briefly storing recent thoughts and experiences. This stage is not just a temporary shelf for holding incoming information. It's an active scratchpad where your brain actively processes information by making sense of new input and linking it with long-term memories. It also works in the opposite direction, by processing already stored information. Whether we hear "*eye-screem*" as *ice cream* or *I scream* depends on how the context and our experience guide our interpreting and encoding of the sounds. To focus on the active processing that takes place in this middle stage, psychologists use the term **working memory**. Right now, you are using your working memory to link the information you're reading with your previously stored information (Cowan, 2010, 2016; Kail & Hall, 2001).

working memory

a newer understanding of short-term memory that adds conscious, active processing of incoming auditory and visual information, and of information retrieved from long-term memory.

For most of you, what you are reading enters working memory through vision. You might also repeat the information using auditory rehearsal. As you integrate these memory inputs with your existing long-term memory, your attention is focused (recall from Module 16 the mental spotlight that we call *selective attention*). In Baddeley's (2002) model, a *central executive* coordinates this focused processing (**Figure 31.4**).

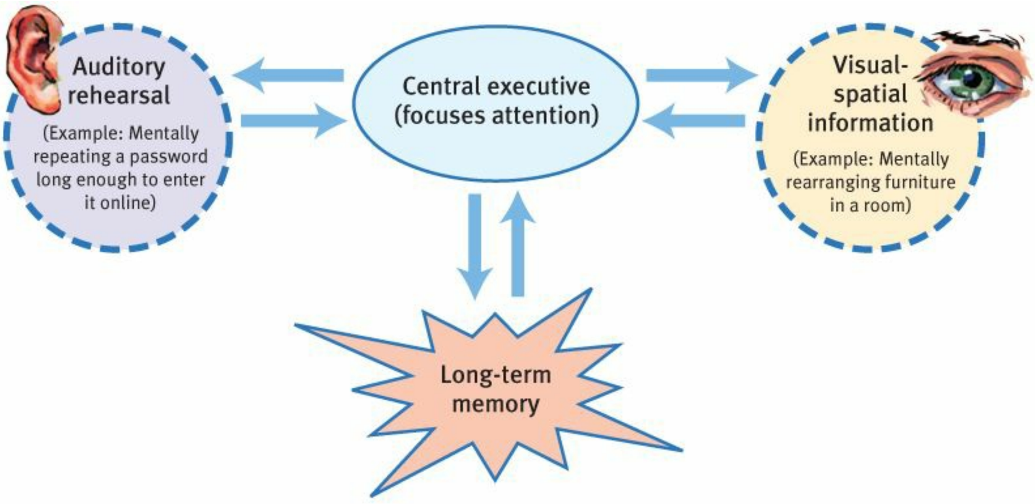
Auditory rehearsal
(Example: Mentally repeating a password long enough to enter it online)
Central executive (focuses attention)
Visual-spatial information
(Example: Mentally rearranging furniture in a room)
Long-term memory

Figure 31.4
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Figure 31.4 Working memory

Alan Baddeley's (2002) model of working memory, simplified here, includes *visual* and *auditory rehearsal* of new information. A hypothetical *central executive* (manager) focuses our attention, and pulls information from long-term memory to help make sense of new information.

AP® EXAM TIP

You will see several versions of Figure 31.3 as you work your way through Modules 31, 32, and 33. Pay attention! This model may look confusing now, but it will make more and more sense as its components are described in detail.

The three stages of memory and the encoding process will be important to know for the AP® exam.

Without focused attention, information often fades. If you think you can look something up later, you attend to it less and forget it more quickly. In one experiment, people read and typed new bits of trivia they would later need, such as “An ostrich’s eye is bigger than its brain.” If they knew the information would be available online, they invested less energy and remembered it less well (Sparrow et al., 2011; Wegner & Ward, 2013). Online, out of mind.

✓ Check Your Understanding

Ask Yourself

- How have you used the three parts of your memory system (encoding, storage, and retrieval) in learning something new today?

Test Yourself

- Memory includes (in alphabetical order) long-term memory, sensory memory, and working/short-term memory. What’s the correct order of these in the three-stage memory model?
- How does the *working memory* concept update the classic Atkinson-Shiffrin three-stage information-processing model?
- What are two basic functions of working memory?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Encoding Memories

Flip It Video: Improving Encoding

Dual-Track Memory: Effortful Versus Automatic Processing

31-3 How do explicit and implicit memories differ?

Atkinson and Shiffrin’s model focused on how we process our **explicit memories**—the facts and experiences that we can consciously know and declare (thus, also called *declarative memories*). We encode explicit memories through conscious **effortful processing**. But our mind has a second, unconscious track. Behind the scenes, other information skips the conscious encoding track and barges directly into storage. This **automatic processing**, which happens without our awareness, produces **implicit memories** (also called *nondeclarative memories*).

explicit memory

retention of facts and experiences that one can consciously know and “declare.” (Also called *declarative memory*.)

effortful processing

encoding that requires attention and conscious effort.

automatic processing

unconscious encoding of incidental information, such as space, time, and frequency, and of well-learned information, such as word meanings.

implicit memory

retention of learned skills or classically conditioned associations independent of conscious recollection. (Also called *nondeclarative memory*.)

Our two-track mind, then, helps us encode, retain, and retrieve information through both effortful and automatic tracks. Let’s begin by seeing how automatic processing assists the formation of implicit memories.

Automatic Processing and Implicit Memories

31-4 What information do we process automatically?

Our implicit memories include *procedural* memory for automatic skills (such as how to ride a bike) and classically conditioned *associations* among stimuli. If attacked by a dog in childhood, years later you may, without recalling the conditioned association, automatically tense up as a dog approaches.

Without conscious effort you also automatically process information about

- *space*. While studying, you often encode the place on a page or in your notebook where certain material appears; later, when you want to retrieve the information, you may visualize its location.
- *time*. While going about your day, you unintentionally note the sequence of its events. Later, realizing you've left your backpack somewhere, the event sequence your brain automatically encoded will enable you to retrace your steps and find the backpack.
- *frequency*. You effortlessly keep track of how many times things happen, as when you realize, "This is the third time I've run into her today."

Our two-track mind engages in impressively efficient information processing. As one track automatically tucks away routine details, the other track is free to focus on conscious, effortful processing. This reinforces an important principle introduced in Module 18's description of *parallel processing*: Mental feats such as vision, thinking, and memory may seem to be single abilities, but they are not. Rather, we split information into different components for separate and simultaneous processing.

Effortful Processing and Explicit Memories

Automatic processing happens effortlessly. When you see words in your native language, perhaps on the side of a delivery truck, you can’t help but read them and register their meaning. *Learning* to read wasn’t automatic. You may recall working hard to pick out letters and connect them to certain sounds. But with experience and practice, your reading became automatic. Imagine now learning to read sentences in reverse:

.citamotua emoceb nac gnissecorp luftroffE

At first, this requires effort, but after enough practice, you would also perform this task much more automatically. We develop many skills in this way: driving, texting, and speaking a new language.

Sensory Memory

31-5 How does sensory memory work?

Sensory memory (recall Figure 31.3) feeds our active working memory, recording momentary images of scenes or echoes of sounds. How much of this page could you sense and recall with less exposure than a lightning flash? In one experiment, people viewed three rows of three letters each, for only one-twentieth of a second (**Figure 31.5**). After the nine letters disappeared, they could recall only about half of them.

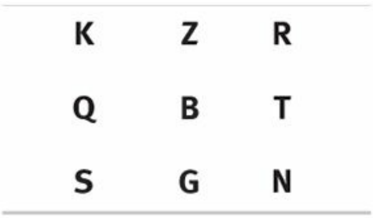

Figure 31.5
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Figure 31.5 Total recall—briefly

When George Sperling (1960) flashed a group of letters similar to this for one-twentieth of a second, people could recall only about half the letters. But when signaled to recall a particular row immediately after the letters had disappeared, they could do so with near-perfect accuracy.

Was it because they had insufficient time to glimpse them? *No.* People actually *could* see and recall all the letters, but only momentarily. Rather than ask them to recall all nine letters at once, researcher George Sperling sounded a high, medium, or low tone immediately *after* flashing the nine letters. This tone directed participants to report only the letters of the top, middle, or bottom row, respectively. Now they rarely missed a letter, showing that all nine letters were momentarily available for recall.

Sperling’s experiment demonstrated **iconic memory**, a fleeting sensory memory of visual stimuli. For a few tenths of a second, our eyes register a picture-image memory of a scene, and we can recall any part of it in amazing detail. But delaying the tone signal by more than half a second caused the image to fade and memory to suffer. We also have an impeccable, though fleeting, memory for auditory stimuli, called **echoic memory** (Cowan, 1988; Lu et al., 1992). Picture yourself in class, as your attention drifts to thoughts of the weekend. If your mildly irked teacher tests you by asking, “What did I just say?” you can recover the last few words from your mind’s echo chamber. Auditory echoes tend to linger for 3 or 4 seconds.

iconic memory

a momentary sensory memory of visual stimuli; a picture-image memory lasting no more than a few tenths of a second.

echoic memory

a momentary sensory memory of auditory stimuli; if attention is elsewhere, sounds and words can still be recalled within 3 or 4 seconds.

Short-Term Memory Capacity

31-6 What is our short-term and working memory capacity?

Recall that short-term memory refers to what we can briefly retain. The related idea of working memory also includes our active processing, as our brain makes sense of incoming information and links it with stored memories. What are the limits of what we can hold in this middle, short-term stage?

George Miller (1956) proposed that we can store about seven pieces of information (give or take two) in short-term memory. Miller's magical number seven is psychology's contribution to the list of magical sevens—the seven wonders of the world, the seven seas, the seven deadly sins, the seven colors of the rainbow, the seven musical scale notes, the seven days of the week—seven magical sevens.

Other researchers have confirmed that we can, if nothing distracts us, recall about seven digits. But the number varies by task; we tend to remember about six letters and only about five words (Baddeley et al., 1975; Cowan, 2015). And how quickly do our short-term memories disappear? To find out, Lloyd Peterson and Margaret Peterson (1959) asked people to remember three-consonant groups, such as *CHJ*. To prevent rehearsal, the researchers asked them, for example, to start at 100 and begin counting aloud backward by threes. After 3 seconds, people recalled the letters only about half the time; after 12 seconds, they seldom recalled them at all (**Figure 31.6**). Without the active processing that we now understand to be a part of our working memory, short-term memories have a limited life.

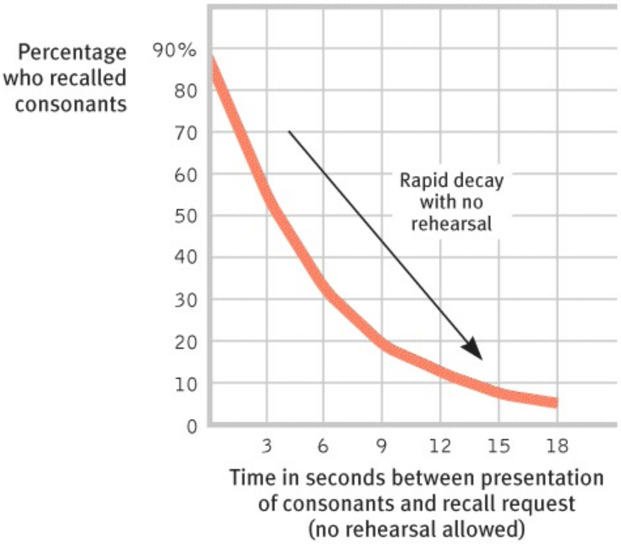

Figure 31.6
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Data from Peterson & Peterson, 1959; see also Brown, 1958.

Figure 31.6 Short-term memory decay

Unless rehearsed, verbal information may be quickly forgotten.

Working memory capacity varies, depending on age and other factors. Compared with children and older adults, young adults have a greater working memory capacity. Having a large working memory capacity—the ability to juggle multiple items while processing information—tends to aid information retention after sleeping and creative problem solving (De Dreu et al., 2012; Fenn & Hambrick, 2012; Wiley & Jarosz, 2012). But whatever our age, we do better and more efficient work when focused, without distractions, on one task at a time. *The bottom line:* It's probably a bad idea to try to watch TV, text your friends, and write a psychology paper all at the same time, with your attention switching between them (Willingham, 2010).

Effortful Processing Strategies

31-7 What are some effortful processing strategies that can help us remember new information?

Several effortful processing strategies can boost our ability to form new memories. Later, when we try to retrieve a memory, these strategies can make the difference between success and failure.

CHUNKING Glance for a few seconds at the first set of letters (row 1) in **Figure 31.7**, then look away and try to reproduce what you saw. Impossible, yes? But you can easily reproduce set 2, which is no less complex. Similarly, you will probably remember sets 4 and 6 more easily than the same elements in sets 3 and 5. As this demonstrates, **chunking** information—organizing items into familiar, manageable units—enables us to recall it more easily. Try remembering 43 individual numbers and letters. It would be impossible, unless chunked into, say, seven meaningful chunks, such as “Try remembering 43 individual numbers and letters.” 🙂

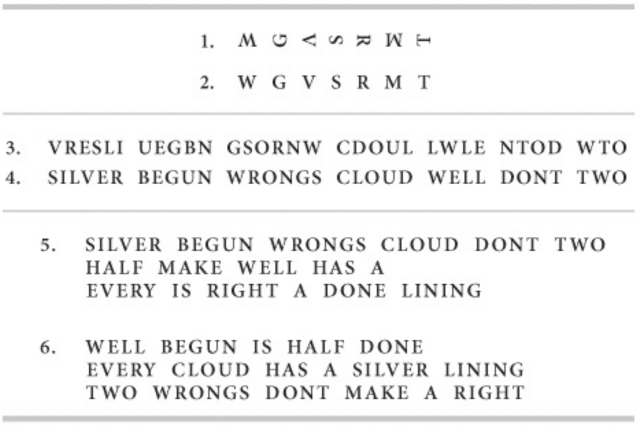
1.
2. W G V S R M T
3. VRESLI UEGBN GSORNW CDOUL LWLE NTOD WTO
4. SILVER BEGUN WRONGS CLOUD WELL DONT TWO
5. SILVER BEGUN WRONGS CLOUD DONT TWO
HALF MAKE WELL HAS A
EVERY IS RIGHT A DONE LINING
6. WELL BEGUN IS HALF DONE
EVERY CLOUD HAS A SILVER LINING
TWO WRONGS DONT MAKE A RIGHT

Figure 31.7
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Figure 31.7 Chunking effects

Organizing information into meaningful units, such as letters, words, and phrases, helps us recall it more easily (Hintzman, 1978).

chunking

organizing items into familiar, manageable units; often occurs automatically.

Chunking usually occurs so naturally that we take it for granted. If you are a native English speaker, you can reproduce perfectly the 150 or so line segments that make up the words in the three phrases of set 6 in Figure 31.7. It would astonish someone unfamiliar with the language. We [DM and ND], who do not speak Chinese, are similarly awed by a Chinese reader’s ability to glance at **Figure 31.8** and then reproduce all the strokes. Even the most committed sports fan may be amazed by a varsity basketball player’s recall of all the players’ positions after a 4-second peek at a basketball play (Allard & Burnett, 1985). We all remember information best when we can organize it into personally meaningful arrangements.

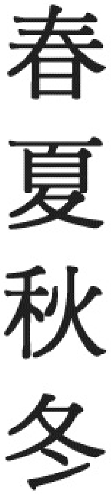

Figure 31.8
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Figure 31.8 An example of chunking—for those who read Chinese

After looking at these characters, can you reproduce them exactly? If so, you can read Chinese.

MNEMONICS To help encode lengthy passages and speeches, ancient Greek scholars and orators developed **mnemonics**. Many of these memory aids use vivid imagery, because we are particularly good at remembering mental pictures. We more easily remember concrete, visualizable words than we do abstract words (Akpinar & Berger, 2015). (Try this on a friend or family member: Tell them that in another few minutes you will invite them to recall these words—*bicycle, void, cigarette, inherent, fire, process*. Is their recall better for the three visualizable words—bicycle, cigarette, and fire?) If you still recall the rock-throwing rioter sentence, it is probably not only because of the meaning you encoded but also because the sentence painted a mental image.

mnemonics [nih-MON-iks]
memory aids, especially those techniques that use vivid imagery and organizational devices.

The *peg-word system* harnesses our superior visual-imagery skill. This mnemonic requires you to memorize a jingle: "*One is a bun; two is a shoe; three is a tree; four is a door; five is a hive; six is sticks; seven is heaven; eight is a gate; nine is swine; ten is a hen*." Without much effort, you will soon be able to count by peg-words instead of numbers: *bun, shoe, tree* . . . and then to visually associate the peg-words with to-be-remembered items. Now you are ready to challenge anyone to give you a grocery list to remember. Carrots? Stick them into the imaginary bun. Milk? Fill the shoe with it. Paper towels? Drape them over the tree branch. Think *bun, shoe, tree* and you see their associated images: carrots, milk, paper towels. With few errors, you will be able to recall the items in any order and to name any given item (Bugelski et al., 1968).

Memory whizzes understand the power of such systems. Star performers in the World Memory Championships do not usually have exceptional intelligence, but rather are superior at using mnemonic strategies (Maguire et al., 2003b). Frustrated by his ordinary memory, science writer Joshua Foer wanted to see how much he could improve it. After a year of intense practice, he won the U.S. Memory Championship by memorizing a pack of 52 playing cards in under two minutes. How did Foer do it? He added vivid new details to memories of a familiar place—his childhood home. Each card, presented in any order, could then match up with the clear picture in his head. As the test subject of his own wild memory experiment, he learned that "you don't have to be memorizing packs of playing cards to benefit from a little bit of insight into how your mind works” (Foer, 2011a,b).

When combined, chunking and mnemonic techniques can be great memory aids for unfamiliar material. Want to remember the colors of the rainbow in order of wavelength? Think of the mnemonic ROY G. BIV (*r*ed, *o*range, *y*ellow, *g*reen, *b*lue, *i*ndigo, *v*iolet). Need to recall the names of North America’s five Great Lakes? Just remember HOMES (*H*uron, *O*ntario, *M*ichigan, *E*rie, *S*uperior). In each case, we chunk information into a more familiar form by creating a word (called an *acronym*) from the first letters of the to-be-remembered items.

HIERARCHIES When people develop expertise in an area, they process information not only in chunks but also in *hierarchies* composed of a few broad concepts divided and subdivided into narrower concepts and facts. (Figure 32.4 ahead provides a hierarchy of our automatic and effortful memory processing systems.) Organizing knowledge in hierarchies helps us retrieve information efficiently, as Gordon Bower and his colleagues (1969) demonstrated by presenting words either randomly or grouped into categories. When the words were grouped, recall was two to three times better. Such results show the benefits of organizing what you study—of giving special attention to the Module Learning Targets, headings, and Ask Yourself and Test Yourself questions. Taking class and text notes in outline form—a type of hierarchical organization—may also prove helpful (**Figure 31.9**).

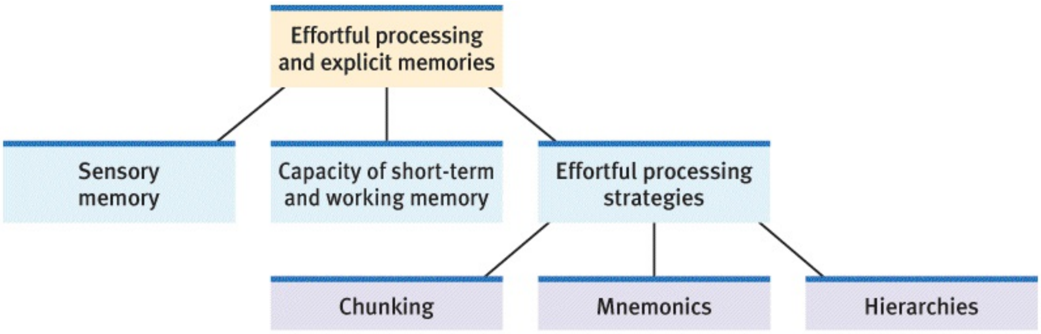
Effortful processing and explicit memories
Sensory memory
Capacity of short-term and working memory
Effortful processing strategies
Chunking
Mnemonics
Hierarchies

Figure 31.9
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Figure 31.9 Hierarchies aid retrieval

When we organize words or concepts into hierarchical groups, as illustrated here with some of the concepts from this section, we remember them better than when we see them presented randomly.

Distributed Practice

We retain information better when our encoding is distributed over time. Experiments have consistently revealed the benefits of this **spacing effect** (Cepeda et al., 2006; Soderstrom et al., 2016). *Massed practice* (cramming) can produce speedy short-term learning and a feeling of confidence. But to paraphrase Ebbinghaus (1885), those who learn quickly also forget quickly. *Distributed practice* produces better long-term recall. After you've studied long enough to master the material, further study at that time becomes inefficient. Better to spend that extra reviewing time later—a day later if you need to remember something 10 days hence, or a month later if you need to remember something 6 months hence (Cepeda et al., 2008). The spacing effect is one of psychology's most reliable findings, and it extends to motor skills and online game performance, too (Stafford & Dewar, 2014). Memory researcher Henry Roediger (2013) sums it up: "Hundreds of studies have shown that distributed practice leads to more durable learning."

spacing effect

the tendency for *distributed* study or practice to yield better long-term retention than is achieved through *massed* study or practice.

> “*The mind is slow in unlearning what it has been long in learning.*”
>
> *Roman philosopher Seneca (4 B.C.E.–65 C.E.)*

One effective way to distribute practice is *repeated* self-testing, a phenomenon that researchers Roediger and Jeffrey Karpicke (2006) have called the **testing effect**. Testing does more than assess learning and memory: It improves them (Brown et al., 2014; Pan et al., 2015; Trumbo et al., 2016). In this text, the testing questions interspersed throughout and at the end of each module and unit offer opportunities to improve learning and memory. Better to practice retrieval (as any exam will demand) than to merely reread material (which may lull you into a false sense of mastery). Roediger (2013) explains, “Two techniques that students frequently report using for studying—highlighting (or underlining) text and rereading text—[have been found] ineffective.” Happily, “retrieval practice (or testing) is a powerful and general strategy for learning.” As another memory expert explained, “What we recall becomes more recallable” (Bjork, 2011). No wonder daily quizzing improves psychology students’ course performance (Batsell et al., 2017; Pennebaker et al., 2013).

AP® EXAM TIP

It’s not the studying you do in May that will determine your success on the AP® exam; it’s the studying you do now. It’s a good idea to take a little time each week to quickly review material from earlier in the course. When was the last time you looked at information from the previous units?

testing effect

enhanced memory after retrieving, rather than simply rereading, information. Also sometimes referred to as a *retrieval practice effect* or *test-enhanced learning*.

The point to remember: Spaced study and self-assessment beat cramming and rereading. Practice may not make perfect, but smart practice—occasional rehearsal with self-testing—makes for lasting memories.

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✓ Check Your Understanding

Ask Yourself

- Does it surprise you to learn how much of your memory processing is automatic? What might life be like if *all* memory processing were effortful?

Test Yourself

- What is the difference between *automatic* and *effortful* processing, and what are some examples of each?
- At which of Atkinson-Shiffrin’s three memory stages would *iconic* and *echoic* memory occur?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Levels of Processing

31-8 What are the levels of processing, and how do they affect encoding?

Memory researchers have discovered that we process verbal information at different levels, and that depth of processing affects our long-term retention. **Shallow processing** encodes on an elementary level, such as a word’s letters or, at a more intermediate level, a word’s sound. Thus we may type *there* when we mean *their*, *write* when we mean *right*, and *two* when we mean *too*. **Deep processing** encodes *semantically*, based on the meaning of the words. The deeper (more meaningful) the processing, the better our retention.

shallow processing

encoding on a basic level, based on the structure or appearance of words.

deep processing

encoding semantically, based on the meaning of the words; tends to yield the best retention.

In one classic experiment, researchers Fergus Craik and Endel Tulving (1975) flashed words at viewers. Then they asked them questions that would elicit different levels of processing. To experience the task yourself, rapidly answer the following sample questions:

TABLE 31.1 Sample Questions to Elicit Different Levels of Processing

Sample Questions	**Word Flashed**	**Yes**	**No**
Most shallow: Is the word in capital letters?	CHAIR	________	________
Shallow: Does the word rhyme with train?	brain	________	________
Deep: Would the word fit in this sentence? The girl put the ________ on the table.	doll	________	________

Which type of processing would best prepare you to recognize the words at a later time? In Craik and Tulving’s experiment, the deeper, semantic processing triggered by the third question yielded a much better memory than did the shallower processing elicited by the second question or the very shallow processing elicited by the first question (which was especially ineffective).

Making Material Personally Meaningful

If new information is neither meaningful nor related to our experience, we have trouble processing it. Imagine being asked to remember the following recorded passage:

> The procedure is actually quite simple. First you arrange things into different groups. Of course, one pile may be sufficient depending on how much there is to do. . . . After the procedure is completed, one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually they will be used once more and the whole cycle will then have to be repeated. However, that is part of life.

When some students heard the paragraph you have just read, without a meaningful context, they remembered little of it (Bransford & Johnson, 1972). When others were told the paragraph described washing clothes (something meaningful), they remembered much more of it—as you probably could now after rereading it.

AP® EXAM TIP

Are you often pressed for time? The most effective way to cut down on the amount of time you need to spend studying is to increase the personal meaningfulness of the material you're trying to remember. If you can relate the material to your own life—and that's pretty easy when you're studying psychology—it takes less time to master it.

Can you repeat the sentence about the rioter that we gave you at this module's beginning ("The angry rioter threw . . .")? Perhaps, like those in an experiment by William Brewer (1977), you recalled the sentence by the meaning you encoded when you read it (for example, "The angry rioter threw the rock *through* the window") and not as it was written ("The angry rioter threw the rock *at* the window"). Referring to such mental mismatches, some researchers have likened our minds to theater directors who, given a raw script, imagine the finished stage production (Bower & Morrow, 1990). Asked later what we heard or read, we recall not the literal text but *what we encoded.* Thus, studying for a test, you may remember your class notes rather than the class itself.

TRY THIS

Here is another sentence we will ask you about later (in Module 33): “The fish attacked the swimmer.”

We can avoid some of these mismatches by rephrasing what we see and hear into meaningful terms. From his experiments on himself, Ebbinghaus estimated that, compared with learning nonsense material, learning meaningful material required one-tenth the effort. As memory researcher Wayne Wickelgren (1977, p. 346) noted, “The time you spend thinking about material you are reading and relating it to previously stored material is about the most useful thing you can do in learning any new subject matter.”

Psychologist-actor team Helga Noice and Tony Noice (2006) have described how actors inject meaning into the daunting task of learning “all those lines.” They do it by first coming to understand the flow of meaning: “One actor divided a half-page of dialogue into three [intentions]: ‘to flatter,’ ‘to draw him out,’ and ‘to allay his fears.’” With this meaningful sequence in mind, the actor more easily remembers the lines.

Most people excel at remembering personally relevant information. Asked how well certain adjectives describe someone else, we often forget them; asked how well the adjectives describe us, we often remember them. This tendency, called the *self-reference effect,* is especially strong in members of individualist Western cultures (Symons & Johnson, 1997; Wagar & Cohen, 2003). In contrast, members of collectivist Eastern cultures tend to remember self-relevant and family-relevant information equally well (Sparks et al., 2016). Knowing this, you can understand why some people retain information deemed “relevant to me,” whereas others also remember information relevant to “my family.”

The point to remember: The amount remembered depends both on the time spent learning and on your making it meaningful for deep processing.

✓ Check Your Understanding

Ask Yourself

- Can you think of three ways to employ the principles in this section to improve your own learning and retention of important ideas?

Test Yourself

- What would be the most effective strategy to learn and retain a list of names of key historical figures for a week? For a year?
- If you try to make the material you are learning personally meaningful, are you processing at a shallow or a deep level? Which level leads to greater retention?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 31 REVIEW

31-1 What is memory, and how is it measured?

- *Memory* is learning that has persisted over time, through the storage and retrieval of information.
- Evidence of memory may be seen in an ability to *recall* information, *recognize* it, or *relearn* it more easily on a later attempt.

31-2 How do psychologists describe the human memory system?

- Psychologists use memory models to think and communicate about memory.
- Information-processing models involve three processes: *encoding*, *storage*, and *retrieval.*
- Through *parallel processing*, the human brain processes many things simultaneously.
- The connectionism information-processing model views memories as products of interconnected neural networks.
- The three processing stages in the Atkinson-Shiffrin model are *sensory memory*, *short-term memory*, and *long-term memory*. More recent research has updated this model to include two important concepts: (1) *working memory*, to stress the active processing occurring in the second memory stage; and (2) *automatic processing*, to address the processing of information outside of conscious awareness.

31-3 How do explicit and implicit memories differ?

- *Explicit* (declarative) *memories*—our conscious memories of facts and experiences—develop with *effortful processing*, which requires conscious effort and attention.
- *Implicit* (nondeclarative) *memories*—of skills and classically

conditioned associations—happen without our awareness, through automatic processing.

31-4 What information do we process automatically?

- In addition to skills and classically conditioned associations, we automatically process incidental information about space, time, and frequency.

31-5 How does sensory memory work?

- Sensory memory feeds some information into working memory for active processing there.
- An *iconic memory* is a very brief (a few tenths of a second) sensory memory of visual stimuli; an *echoic memory* is a three- or four-second sensory memory of auditory stimuli.

31-6 What is our short-term and working memory capacity?

- Short-term memory capacity is about seven items, plus or minus two, but this information disappears from memory quickly without rehearsal.
- Working memory capacity varies, depending on age, intelligence level, and other factors.

31-7 What are some effortful processing strategies that can help us remember new information?

- Effective effortful processing strategies include *chunking*, *mnemonics*, hierarchies, and distributed practice sessions (which produce results due to the *spacing effect*).
- The *testing effect* is the finding that consciously retrieving, rather than simply rereading, information enhances memory.

31-8 What are the levels of processing, and how do they affect

encoding?

- Depth of processing affects long-term retention.
  - In *shallow processing*, we encode words based on their structure, appearance, or sound.
  - Retention is best when we use *deep processing*, encoding words based on their meaning.
- We also more easily remember material that is personally meaningful—the self-reference effect.

Multiple-Choice Questions

1. Caitlin, a fifth grader, is asked to remember her second-grade teacher's name. What measure of retention will Caitlin use to answer this question?

a. Storage
b. Recognition
c. Relearning
d. Recall
e. Encoding

2. In history class, James is effortfully connecting the new material to what he has learned in the past. This making of connections in the moment best describes James'

a. iconic memory.
b. sensory memory.
c. working memory.
d. echoic memory.
e. long-term memory.

3. Meloni's new friend from another state just gave her his phone number. As she goes to enter the number into her contacts list she finds that she cannot remember all the numbers in their right order. Which of the following is the best explanation for this failure?

a. Being 10 digits long, the number is beyond Miller’s “magic number.”
b. She was so excited that she could not type the numbers fast enough.
c. She lacks photographic memory.
d. Because the number was so short, she did not pay enough attention to it.
e. Her iconic memory disrupted her encoding of the number.

4. Which of the following is most likely to be encoded automatically?

a. The side-angle-side geometry theorem
b. The names of the last 10 U.S. presidents
c. What you ate for breakfast this morning
d. The names of your cousins
e. The license plate of your new car

5. Which of the following is most likely to lead to semantic encoding of a list of words?

a. Thinking about how the words relate to your own life
b. Practicing the words for a single extended period
c. Breaking up the practice into several relatively short sessions
d. Noticing where in a sentence the words appear
e. Focusing on the number of vowels and consonants in the words

Practice FRQs

1. To remember something, we must get information into our brain, retain the information, and later get the information back out. Use the correct terms for these three steps of the process, and explain how this system would apply if you needed to learn the name of a new student who just enrolled in your school today.

Answer

1 point: Encoding is the process of getting the new student’s name into your brain. ↩ Page 329

1 point: Storage is keeping that name in your memory. ↩ Page 329

1 point: Retrieval is the process of using that name when greeting the new student later. ↩ Page 329

2. Last evening, Carlos’ mom told him he needed to buy milk today. So, he hopped on his bicycle this morning and headed to the corner store to pick up a gallon. Explain how both implicit and explicit memories were involved in Carlos’ errand.

(4 points)

Module **32 Storing and Retrieving Memories**

LEARNING TARGETS

- 32-1 Discuss the capacity of and location of our long-term memories.
- 32-2 Describe the roles of the frontal lobes and hippocampus in memory processing.
- 32-3 Describe the roles of the cerebellum and basal ganglia in memory processing.
- 32-4 Discuss how emotions affect our memory processing.
- 32-5 Explain how changes at the synapse level affect our memory processing.
- 32-6 Analyze how external cues, internal emotions, and order of appearance influence memory retrieval.

Memory Storage

32-1 What is the capacity of long-term memory? Are our long-term memories processed and stored in specific locations?

In Arthur Conan Doyle's *A Study in Scarlet,* Sherlock Holmes offers a popular theory of memory capacity:

> I consider that a man's brain originally is like a little empty attic, and you have to stock it with such furniture as you choose. . . . It is a mistake to think that that little room has elastic walls and can distend to any extent. Depend upon it, there comes a time when for every addition of knowledge you forget something that you knew before.

Contrary to Holmes' "memory model," our brain is *not* like an attic, which once filled can store more items only if we discard old ones. Our capacity for storing long-term memories is essentially limitless. One research team, after studying the brain's neural connections, estimated its storage capacity as "in the same ballpark as the World Wide Web" (Sejnowski, 2016).

Retaining Information in the Brain

I [DM] marveled at my aging mother-in-law, a retired pianist and organist. At age 88, her blind eyes could no longer read music. But let her sit at a keyboard and she would flawlessly play any of hundreds of hymns, including ones she had not thought of for 20 years. Where did her brain store those thousands of sequenced notes?

For a time, some surgeons and memory researchers marveled at patients' apparently vivid memories triggered by brain stimulation during surgery. Did this prove that our whole past, not just well-practiced music, is "in there," in complete detail, just waiting to be relived? On closer analysis, the seeming flashbacks appeared to have been invented, not a vivid reliving of long-forgotten experiences (Loftus & Loftus, 1980). In a further demonstration that memories do not reside in single, specific spots, psychologist Karl Lashley (1950) trained rats to find their way out of a maze, then surgically removed pieces of their brain's cortex and retested their memory. No matter which small brain section he removed, the rats retained at least a partial memory of how to navigate the maze. Memories *are* brain-based, but the brain distributes the components of a memory across a network of locations. These specific locations include some of the circuitry involved in the original experience: Some brain cells that fire when we experience something fire again when we recall it (Miller, 2012a; Miller et al., 2013).

> “*Our memories are flexible and superimposable, a panoramic blackboard with an endless supply of chalk and erasers.*”
>
> *Elizabeth Loftus and Katherine Ketcham,* The Myth of Repressed Memory, *1994*

The point to remember: Despite the brain's vast storage capacity, we do not store information as libraries store their books, in single, precise locations. Instead, brain networks encode, store, and retrieve the information that forms our complex memories.

Explicit Memory System: The Frontal Lobes and Hippocampus

32-2 What roles do the frontal lobes and hippocampus play in memory processing?

Explicit, conscious memories are either **semantic** (facts and general knowledge) or **episodic** (experienced events). The network that processes and stores new explicit memories for these facts and episodes includes your frontal lobes and hippocampus. When you summon up a mental encore of a past experience, many brain regions send input to your *prefrontal cortex* (the front part of your frontal lobes) for working memory processing (de Chastelaine et al., 2016; Michalka et al., 2015). The left and right frontal lobes process different types of memories. Recalling a password and holding it in working memory, for example, would activate the left frontal lobe. Calling up a visual party scene would more likely activate the right frontal lobe.

semantic memory

explicit memory of facts and general knowledge; one of our two conscious memory systems (the other is *episodic memory*).

episodic memory

explicit memory of personally experienced events; one of our two conscious memory systems (the other is *semantic memory*).

Cognitive neuroscientists have found that the **hippocampus**, a temporal-lobe neural center located in the limbic system, can be likened to a “save” button for explicit memories (**Figure 32.1**). Brain scans reveal activity in the hippocampus and nearby brain networks as people form explicit memories of names, images, and events (Squire & Wixted, 2011; Wang et al., 2014).

hippocampus

a neural center located in the limbic system; helps process explicit (conscious) memories—of facts and events—for storage.

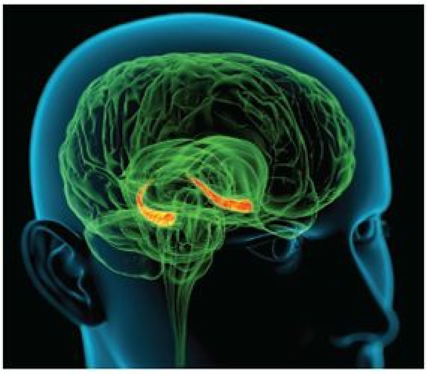


Figure 32.1

Roger Harris/Science Source

Figure 32.1 The hippocampus

Explicit memories for facts and episodes are processed in the hippocampus (orange structures) and fed to other brain regions for storage.

Damage to this structure therefore disrupts the formation and recall of explicit memories. If their hippocampus is severed, chickadees and other birds will continue to cache food in hundreds of places, but later be unable to find them (Kamil & Cheng, 2001; Sherry & Vaccarino, 1989). With left-hippocampus damage, people have trouble remembering verbal information, but they have no trouble recalling visual designs and locations. With right-hippocampus damage, the problem is reversed (Schacter, 1996).

Subregions of the hippocampus also serve different functions. One part is active as people and mice learn social information (Okuyama et al., 2016; Zeineh et al., 2003). Another part is active as memory champions engage in spatial mnemonics (Maguire et al., 2003a). The rear area, which processes spatial memory, grows bigger as London cabbies navigate the city's complicated maze of streets (Woolett & Maguire, 2011).

Memories are not permanently stored in the hippocampus. Instead, this structure seems to act as a loading dock where the brain registers and temporarily holds the elements of a to-be-remembered episode—its smell, feel, sound, and location. Then, like older files shifted to a basement storeroom, memories migrate for storage elsewhere. This storage process is called **memory consolidation**. Removing a rat's hippocampus 3 hours after it learns the location of some tasty new food disrupts this process and prevents long-term memory formation; removal 48 hours later does not (Tse et al., 2007).

memory consolidation

the neural storage of a long-term memory.

Sleep supports memory consolidation. In one experiment, students who learned material in a study/sleep/restudy condition remembered material better both a week and six months later than those who studied in the morning and restudied in the evening without intervening sleep (Mazza et al., 2016). During deep sleep, the hippocampus processes memories for later retrieval. After a training experience, the greater one's heart rate efficiency and hippocampus activity during sleep, the better the next day's memory will be (Peigneux et al., 2004; Whitehurst et al., 2016). Researchers have watched the hippocampus and brain cortex displaying simultaneous activity rhythms during sleep, as if they were having a dialogue (Euston et al., 2007; Mehta, 2007). They suspect that the brain is replaying the day's experiences as it transfers them to the cortex for long-term storage (Squire & Zola-Morgan, 1991). When our learning is distributed over days rather than crammed into a single day, we experience more sleep-induced memory consolidation. And that helps explain the spacing effect.

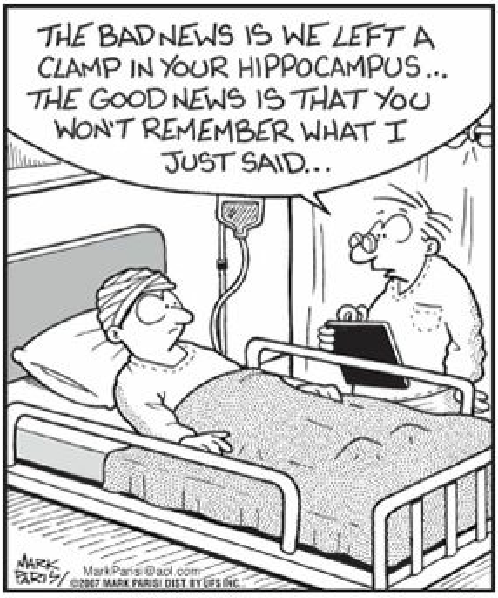
Tim Zurowski/All Canada Photos/Getty Images

Hippocampus hero Among animals, one contender for champion memorist would be a mere birdbrain—the Clark's Nutcracker—which during winter and spring can locate up to 6000 caches of pine seed it had previously buried (Shettleworth, 1993).

Implicit Memory System: The Cerebellum and Basal Ganglia

32-3 What roles do the cerebellum and basal ganglia play in memory processing?

Your hippocampus and frontal lobes are processing sites for your *explicit* memories. But you could lose those areas and still, thanks to automatic processing, lay down *implicit* memories for skills and newly conditioned associations. Joseph LeDoux (1996) recounted the story of a brain-damaged patient whose amnesia left her unable to recognize her physician as, each day, he shook her hand and introduced himself. One day, she yanked her hand back, for the physician had pricked her with a tack in his palm. The next time he returned to introduce himself she refused to shake his hand but couldn't explain why. Having been classically conditioned, she just wouldn't do it. Implicitly, she felt what she could not explain.


THE BAD NEWS IS WE LEFT A CLAMP IN YOUR HIPPOCAMPUS... THE GOOD NEWS IS THAT YOU WON'T REMEMBER WHAT I JUST SAID...
MARK PARISI
MarkParisi@aol.com
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The *cerebellum* plays a key role in forming and storing the implicit memories created by classical conditioning. With a damaged cerebellum, people cannot develop certain conditioned reflexes, such as associating a tone with an impending puff of air—and thus do not blink in anticipation of the puff (Daum & Schugens, 1996; Green & Woodruff-Pak, 2000). Implicit memory formation needs the cerebellum.

The *basal ganglia*, deep brain structures involved in motor movement, facilitate formation of our procedural memories for skills (Mishkin, 1982; Mishkin et al., 1997). The basal ganglia receive input from the cortex but do not return the favor of sending information back to the cortex for conscious awareness of procedural learning. If you have learned how to ride a bike, thank your basal ganglia.

Our implicit memory system, enabled by these more ancient brain areas, helps explain why the reactions and skills we learned during infancy reach far into our future. Yet as adults, our *conscious* memory of our first four years is largely blank, an experience called *infantile amnesia*. In one study, events children experienced and discussed with their mothers at age 3 were 60 percent remembered at age 7 but only 34 percent remembered at age 9 (Bauer et al., 2007). Two influences contribute to infantile amnesia: First, we index much of our explicit memory with a command of language that young children do not possess. Second, the hippocampus is one of the last brain structures to mature, and as it does, more gets retained (Akers et al., 2014).

The Amygdala, Emotions, and Memory

32-4 How do emotions affect our memory processing?

Our emotions trigger stress hormones that influence memory formation. When we are excited or stressed, these hormones make more glucose energy available to fuel brain activity, signaling the brain that something important is happening. Moreover, stress hormones focus memory. Stress provokes the *amygdala* (two limbic system, emotion-processing clusters) to initiate a memory trace that boosts activity in the brain’s memory-forming areas (Buchanan, 2007; Kensinger, 2007) (**Figure 32.2**). It’s as if the amygdala says, “Brain, encode this moment for future reference!” The result? Emotional arousal can sear certain events into the brain, while disrupting memory for irrelevant events (Brewin et al., 2007; McGaugh, 2015).

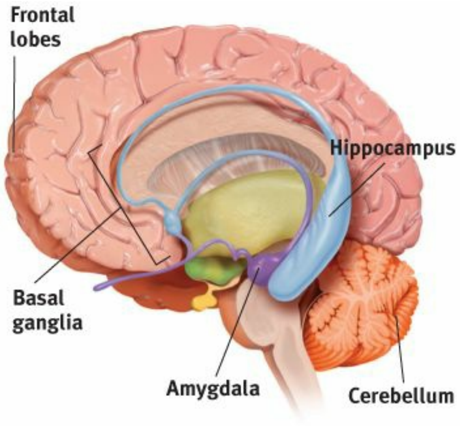

Figure 32.2
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Figure 32.2 Review key memory structures in the brain

Frontal lobes and *hippocampus:* explicit memory formation

Cerebellum and *basal ganglia:* implicit memory formation

Amygdala: emotion-related memory formation

Significantly stressful events can form almost unforgettable memories. After a traumatic experience—a school shooting, a house fire, a rape—vivid recollections of the horrific event may intrude again and again. It is as if they were burned in: "Stronger emotional experiences make for stronger, more reliable memories," noted James McGaugh (1994, 2003). Such experiences even strengthen recall for relevant, immediately preceding events (Dunsmoor et al., 2015: Jobson & Cheraghi, 2016). This makes adaptive sense: Memory serves to predict the future and to alert us to potential dangers. Emotional events produce tunnel vision memory. They focus our attention and recall on high priority information, and reduce our recall of irrelevant details (Mather & Sutherland, 2012). Whatever rivets our attention gets well recalled, at the expense of the surrounding context.

Emotion-triggered hormonal changes help explain why we long remember exciting or shocking events, such as our first kiss or our whereabouts when learning of a loved one's death. In a 2006 Pew survey, 95 percent of American adults said they could recall exactly where they were or what they were doing when they first heard the news of the 9/11 terrorist attacks. This perceived clarity of memories of surprising, significant events (where were you when learning that Donald Trump was elected U.S. president?) leads some psychologists to call them **flashbulb memories**.

flashbulb memory

a clear, sustained memory of an emotionally significant moment or event.

The people who experienced a 1989 San Francisco earthquake had perfect recall, a year and a half later, of where they had been and what they were doing (verified by their recorded thoughts within a day or two of the quake). Others' memories for the circumstances under which they merely *heard* about the quake were more prone to errors (Neisser et al., 1991; Palmer et al., 1991).

Our flashbulb memories are noteworthy for their vividness and our confidence in them. But as we relive, rehearse, and discuss them, even these memories may come to err. With time, some errors crept into people's 9/11 recollections (compared with their earlier reports taken right after 9/11). Mostly, however, people's memories of 9/11 remained consistent over the next two to three years (Conway et al., 2009; Hirst et al., 2009).

Dramatic experiences remain clear in our memory in part because we rehearse them (Hirst & Phelps, 2016). We think about them and describe them to others. Memories of our best experiences, which we enjoy recalling and recounting, also endure (Storm & Jobe, 2012; Talarico & Moore, 2012). One study invited 1563 Boston Red Sox and New York Yankees fans to recall the baseball championship games between their two teams in 2003 (Yankees won) and 2004 (Red Sox won). Fans recalled much better the game their team won (Breslin & Safer, 2011).

FYI

Which is more important—your experiences or your memories of them?

Synaptic Changes

32-5 How do changes at the synapse level affect our memory processing?

As you read this module and think and learn about memory processes, your brain is changing. Given increased activity in particular pathways, neural interconnections are forming and strengthening.

The quest to understand the physical basis of memory—how information becomes embedded in brain matter—has sparked study of the synaptic meeting places where neurons communicate with one another via their neurotransmitter messengers. Eric Kandel and James Schwartz (1982) observed synaptic changes during learning in the neurons of the California sea slug, *Aplysia*, a simple animal with a mere 20,000 or so unusually large and accessible nerve cells. Module 26 noted how the sea slug can be classically conditioned (with electric shock) to reflexively withdraw its gills when squirted with water, much as a soldier traumatized by combat might jump at the sound of a firecracker. When learning occurs, Kandel and Schwartz discovered, the slug releases more of the neurotransmitter *serotonin* into certain neurons. These cells' synapses then become more efficient at transmitting signals. Experience and learning can increase—even double—the number of synapses, even in slugs (Kandel, 2012).

Donna Ikenberry/Art Directors/Alamy Stock Photo

Aplysia The California sea slug, which neuroscientist Eric Kandel studied for 45 years, has increased our understanding of the neural basis of learning and memory.

In experiments with people, rapidly stimulating certain memory-circuit connections has increased their sensitivity for hours or even weeks to come. The sending neuron now needs less prompting to release its neurotransmitter, and more connections exist between neurons. This increased efficiency of potential neural firing, called **long-term potentiation (LTP)**, provides a neural basis for learning and remembering associations (Lynch, 2002; Whitlock et al., 2006) (**Figure 32.3**). Several lines of evidence confirm that LTP is a physical basis for memory:

- Drugs that block LTP interfere with learning (Lynch & Staubli, 1991).
- Drugs that mimic what happens during learning increase LTP (Harward et al., 2016).
- Rats given a drug that enhanced LTP learned a maze with half the usual number of mistakes (Service, 1994).

long-term potentiation (LTP)

an increase in a cell's firing potential after brief, rapid stimulation; a neural basis for learning and memory.

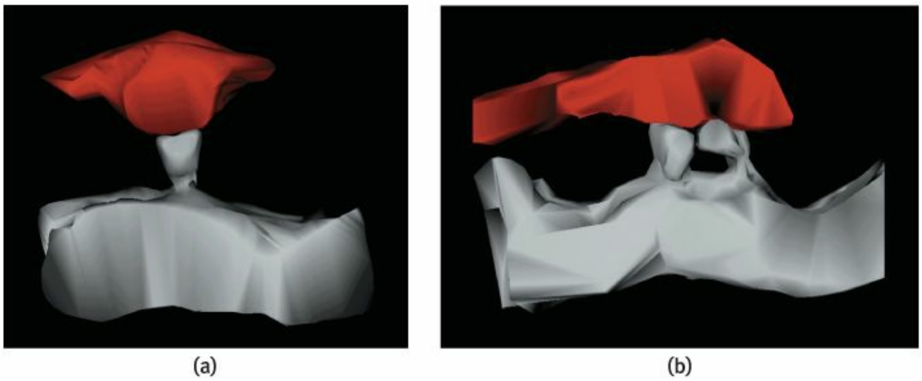

Figure 32.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
From N. Toni et al, *Nature, 402*, Nov. 25, 1999. Dominique Muller

Figure 32.3 Doubled receptor sites

An electron microscope image (a) shows just one receptor site (gray) reaching toward a sending neuron before long-term potentiation. Image (b) shows that, after LTP, the receptor sites have doubled. This means the receiving neuron has increased sensitivity for detecting the presence of the neurotransmitter molecules that may be released by the sending neuron (Toni et al., 1999).

▶ **Flip It Video: Long-Term Potentiation**

After LTP has occurred, passing an electric current through the brain won't disrupt old memories. But the current will wipe out very recent memories. Such is the experience both of laboratory animals and of severely depressed people given *electroconvulsive therapy (ECT)* (see Module 73). A blow to the head can do the same. Football players and boxers momentarily knocked unconscious typically have no memory of events just before the knockout (Yarnell & Lynch, 1970). Their working memory had no time to consolidate the information into long-term memory before the lights went out.

Recently, I [DM] did a little test of memory consolidation. While on an operating table for a basketball-related tendon repair, I was given a face mask and soon could smell the anesthesia gas. "So how much longer will I be with you?" I asked the anesthesiologist. My last moment of memory was her answer: "About 10 seconds." My brain spent that 10 seconds consolidating a memory for her 2-second answer, but could not tuck any further memory away before I was out cold.

Some memory-biology explorers have helped found companies that are competing to develop memory-altering drugs. The target market for memory-boosting drugs includes millions of people with Alzheimer's disease, millions more with *mild cognitive impairment* that often becomes Alzheimer's, and countless millions who would love to turn back the clock on age-related memory decline. Meanwhile, one safe and free memory enhancer is already available for high schoolers everywhere: study followed by adequate *sleep!* (You'll find study tips in Module 2 and at the end of this module, and sleep coverage in Modules 23 and 24.)

One approach to improving memory focuses on drugs that boost the LTP-enhancing neurotransmitter *glutamate* (Lynch et al., 2011). Another approach involves developing drugs that boost production of CREB, a protein that also enhances the LTP process (Fields, 2005). Boosting CREB production might trigger increased production of other proteins that help reshape synapses and transfer short-term memories into long-term memories.

Some of us may wish for memory-*blocking* drugs that, when taken after a traumatic experience, might blunt intrusive memories (Adler, 2012; Kearns et al., 2012). In one experiment, victims of car accidents, rapes, and other traumas received, for 10 days following their horrific event, either one such drug, propranolol, or a placebo. When tested three months later, half the placebo group but none of the drug-treated group showed signs of stress (Pitman & Delahanty, 2005; Pitman et al., 2002).

Figure 32.4 summarizes the brain's two-track memory processing and storage system for implicit (automatic) and explicit (effortful) memories. *The bottom line:* Learn something and you change your brain a little.

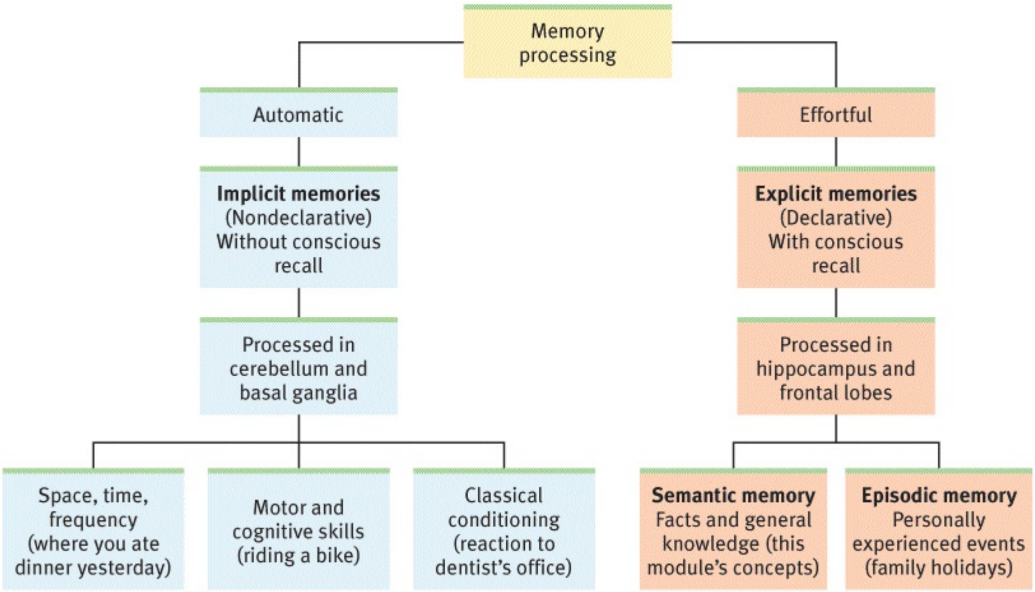
Memory processing
Automatic
Effortful
Implicit memories (Nondeclarative) Without conscious recall
Explicit memories (Declarative) With conscious recall
Processed in cerebellum and basal ganglia
Processed in hippocampus and frontal lobes
Space, time, frequency (where you ate dinner yesterday)
Motor and cognitive skills (riding a bike)
Classical conditioning (reaction to dentist's office)
Semantic memory Facts and general knowledge (this module's concepts)
Episodic memory Personally experienced events (family holidays)

Figure 32.4
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Figure 32.4 **Our two memory systems**

AP® EXAM TIP

Figure 32.4 is an excellent summary. Why don't you review it for a few minutes and then see how much of it you can reproduce on a piece of paper? That will give you a good assessment of which parts of the memory process you know and which parts you still need to work on.

✓ Check Your Understanding

Ask Yourself

- Can you name an instance in which stress has helped you remember something, and another instance in which stress has interfered with remembering something?

Test Yourself

- Which parts of the brain are important for implicit memory processing, and which parts play a key role in explicit memory processing?
- Your friend has experienced brain damage in an accident. He can remember how to tie his shoes but has a hard time remembering anything you tell him during a conversation. How can implicit versus explicit information processing explain what’s going on here?
- Which brain area responds to stress hormones by helping to create stronger memories?
- Increased efficiency at the synapses is evidence of the neural basis of learning and memory. This is called ______________-______________ ______________.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Memory Retrieval

Flip It Video: Improving Retrieval

After the magic of brain encoding and storage, we still have the daunting task of retrieving the information. What triggers retrieval?

Retrieval Cues

32-6 How do external cues, internal emotions, and order of appearance influence memory retrieval?

Imagine a spider suspended in the middle of her web, held up by the many strands extending outward from her in all directions to different points. If you were to trace a pathway to the spider, you would first need to create a path from one of these anchor points and then follow the strand down into the web.

The process of retrieving a memory follows a similar principle, because memories are held in storage by a web of associations, each piece of information interconnected with others. When you encode into memory a target piece of information, such as the name of the person sitting next to you in class, you associate with it other bits of information about your surroundings, mood, seating position, and so on. These bits can serve as *retrieval cues* that you can later use to access the information. The more retrieval cues you have, the better your chances of finding a route to the suspended memory. To remember to do something (say, to write a note tomorrow), one effective strategy is to mentally associate the act with a cue (perhaps a pen left in the middle of your desk) (Rogers & Milkman, 2016).

> “*Memory is not like a container that gradually fills up; it is more like a tree growing hooks onto which memories are hung.*”
>
> *Peter Russell,* The Brain Book, *1979*

The best retrieval cues come from associations we form at the time we encode a memory—smells, tastes, and sights that can evoke our memory of the associated person or event. To call up visual cues when trying to recall something, we may mentally place ourselves in the original context. After losing his sight, British scholar John Hull (1990, p. 174) described his difficulty recalling such details:

> I knew I had been somewhere, and had done particular things with certain people, but where? I could not put the conversations . . . into a context. There was no background, no features against which to identify the place. Normally, the memories of people you have spoken to during the day are stored in frames which include the background.

Priming

Often our associations are activated without our awareness. Philosopher-psychologist William James referred to this process, which we call **priming**, as the "wakening of associations." After seeing or hearing the word *rabbit*, we are later more likely to spell the spoken word *hair/hare* as *h-a-r-e*, even if we don't recall seeing or hearing *rabbit* (**Figure 32.5**).

priming

the activation, often unconsciously, of particular associations in memory.

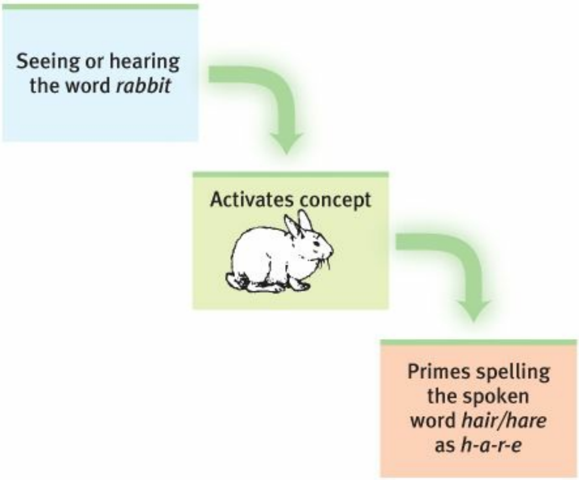
Seeing or hearing the word *rabbit*
Activates concept
Primes spelling the spoken word *hair/hare* as *h-a-r-e*

Figure 32.5
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 32.5 **Priming associations unconsciously activates related associations (Bower, 1986).**

Priming is often “memoryless memory”—an implicit, invisible memory, without your conscious awareness. If, walking down a hallway, you see a poster of a missing child, you may then unconsciously be primed to interpret an ambiguous adult-child interaction as a possible kidnapping (James, 1986). Although you no longer have the poster in mind, it predisposes your interpretation. Meeting someone who reminds us of a person we’ve previously met can awaken our associated feelings about that earlier person, which may transfer into the new context (Andersen & Saribay, 2005; Lewicki, 1985).

Priming can influence behaviors as well (Herring et al., 2013). Adults and children primed with money-related words and materials were less likely to help another person when asked (Gasiorowska et al., 2016; Vohs et al., 2006). In such cases, money may prime our materialism and self-interest rather than the social norms that encourage us to help (Ariely, 2009).

Context-Dependent Memory

Have you noticed? Putting yourself back in the context where you earlier experienced something can prime your memory retrieval. Remembering, in many ways, depends on our environment (Palmer, 1989). When you visit your childhood home or neighborhood, old memories surface. As **Figure 32.6** illustrates, when scuba divers listened to a word list in two different settings (either 10 feet underwater or sitting on the beach), they recalled more words if tested in the same place (Godden & Baddeley, 1975).

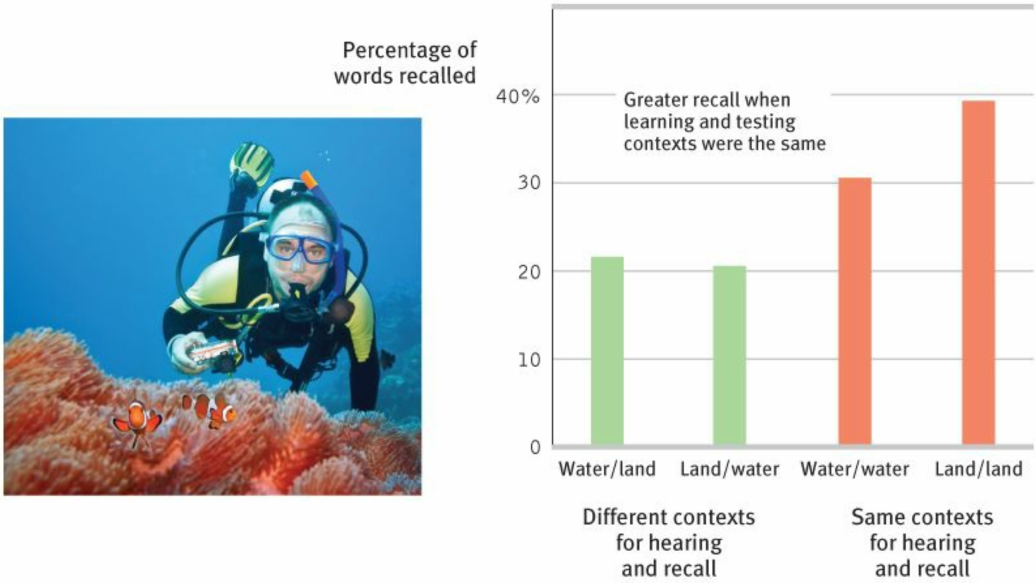

Figure 32.6
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Photo: Khoroshunova Olga/Shutterstock

Figure 32.6 The effects of context on memory

In this experiment, words heard underwater were best recalled underwater. Words heard on land were best recalled on land (Godden & Baddeley, 1975).

By contrast, experiencing something outside the usual setting can be confusing. Have you ever run into a former teacher in an unusual place, such as at the store or park? Perhaps you recognized the person but struggled to figure out who it was and how you were acquainted. The **encoding specificity principle** helps us understand how cues *specific* to an event or person will most effectively trigger that memory. In new settings, you may not have the memory cues needed for speedy face recognition. Our memories are *context-dependent*, and are affected by the cues we have associated with that context. Thankfully, overlearning—mastering the material beyond barely knowing it—can nevertheless enable you to do well when taking an AP exam in a new room.

encoding specificity principle

the idea that cues and contexts specific to a particular memory will be most effective in helping us recall it.

TRY THIS

Ask a friend two rapid-fire questions: (a) How do you pronounce the word spelled by the letters *s-h-o-p*? (b) What do you do when you come to a green light? If your friend answers "stop" to the second question, you have demonstrated priming.

In several experiments, Carolyn Rovee-Collier (1993) found that a familiar context could activate memories even in 3-month-olds. After infants learned that kicking would make a crib mobile move via a connecting ribbon from their ankle, the infants kicked more when tested again in the same crib than when in a different context.

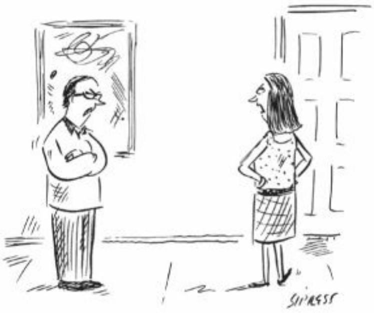
State-Dependent Memory

Closely related to context-dependent memory is *state-dependent memory*. What we learn in one state—be it drunk or sober—may be more easily recalled when we are again in that state. What people learn when drunk they don't recall well in any state (alcohol disrupts memory storage). But they recall it slightly better when again drunk. Someone who hides money when drunk may forget the location until drunk again.

Moods also provide an example of memory's state dependence. Emotions that accompany good or bad events become retrieval cues (Gaddy & Ingram, 2014). Thus, our memories are somewhat **mood congruent**. If you've had a bad evening—your plans with friends fell through, your favorite jeans have disappeared, your Internet went out 10 minutes before the end of a show—your gloomy mood may facilitate recalling other bad times. Being depressed sours memories by priming negative associations, which we then use to explain our current mood. In many experiments, people put in a buoyant mood—whether under hypnosis or just by the day's events (a World Cup soccer victory for German participants in one study)—recall the world through rose-colored glasses (DeSteno et al., 2000; Forgas et al., 1984; Schwarz et al., 1987). They recall their behaviors as competent and effective, other people as benevolent, happy events as more frequent.

mood-congruent memory
the tendency to recall experiences that are consistent with one’s current good or bad mood.

Have you ever noticed that your mood influences your perceptions of your parents? In one study, adolescents’ ratings of parental warmth in one week gave little clue to how they would rate their parents six weeks later (Bornstein et al., 1991). When teens were down, their parents seemed cruel; as their mood brightened, their parents morphed from devils into angels. We may nod our heads knowingly. Yet, in a good or bad mood, we persist in attributing to reality our own changing judgments, memories, and interpretations. In a bad mood, we may read someone’s look as a glare and feel even worse. In a good mood, we may encode the same look as interest and feel even better. Moods magnify.



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“I can’t remember what we’re arguing about, either. Let’s keep yelling, and maybe it will come back to us.”

Mood effects on retrieval help explain why our moods persist. When happy, we recall happy events and therefore see the world as a happy place, which helps prolong our good mood. When depressed, we recall sad events, which darkens our interpretations of current events. For those of us predisposed to depression, this process can help maintain a vicious, dark cycle.

> “*When a feeling was there, they felt as if it would never go; when it was gone, they felt as if it had never been; when it returned, they felt as if it had never gone.*”
>
> *George MacDonald,* What’s Mine’s Mine, *1886*

Serial Position Effect

Another memory-retrieval quirk, the **serial position effect**, explains why we may have large holes in our memory of a list of recent events. Imagine it’s your first day on a job, and your manager is introducing co-workers. As you meet each person, you silently repeat everyone’s name, starting from the beginning. As the last person smiles and turns away, you feel confident you’ll be able to greet your new co-workers by name the next day.

serial position effect

our tendency to recall best the last *(recency effect)* and first *(primacy effect)* items in a list.

Don’t count on it. Because you have spent more time rehearsing the earlier names than the later ones, those are the names you’ll probably recall more easily the next day. In experiments, when people viewed a list of items (words, names, dates, even experienced odors) and immediately tried to recall them in any order, they fell prey to the serial position effect (Reed, 2000). They briefly recalled the last items especially quickly and well (a *recency effect*), perhaps because those last items were still in working memory. But after a delay, when their attention was elsewhere, their recall was best for the first items (a *primacy effect;* see **Figure 32.7**).

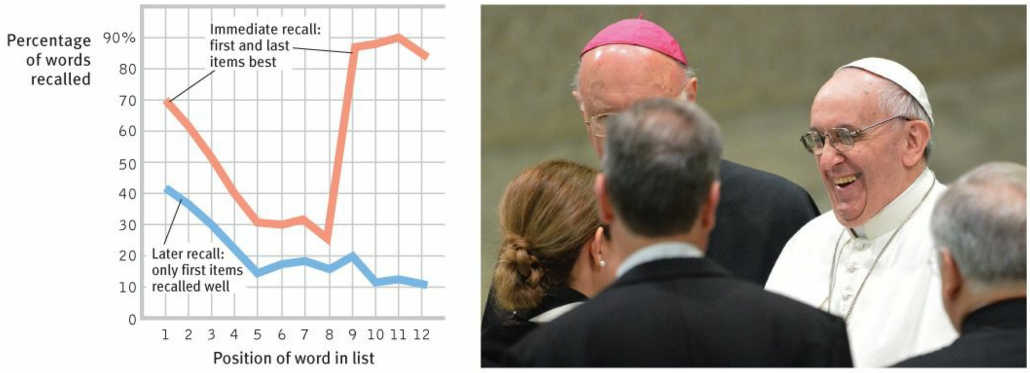

Figure 32.7
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Photo: Vincenzo Pinto/AFP/Getty Images

Figure 32.7 The serial position effect

Immediately after Pope Francis made his way through this receiving line of special guests, he would probably have recalled the names of the last few people best *(recency effect)*. But later he may have been able to recall the first few people best *(primacy effect)*.

✓ Check Your Understanding

Ask Yourself

- What sort of mood have you been in lately? How has your mood colored your memories, perceptions, and expectations?

Test Yourself

- You have just watched a movie that includes a chocolate factory. After the chocolate factory is out of mind, you nevertheless feel a strange urge for a chocolate bar. How do you explain this in terms of priming?
- When we are tested immediately after viewing a list of words, we tend to recall the first and last items best, which is known as the _______________ _______________ effect.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 32 REVIEW

32-1 What is the capacity of long-term memory? Are our long-term memories processed and stored in specific locations?

- Our long-term memory capacity is essentially unlimited.
- Memories are not stored intact in the brain in single spots. Many parts of the brain interact as we form and retrieve memories.

32-2 What roles do the frontal lobes and hippocampus play in memory processing?

- The frontal lobes and *hippocampus* are parts of the brain network dedicated to explicit memory formation.
  - Many brain regions send information to the frontal lobes for processing.
  - The hippocampus, with the help of surrounding areas of cortex, registers and temporarily holds elements of explicit memories before moving them to other brain regions for long-term storage *(memory consolidation)*.

32-3 What roles do the cerebellum and basal ganglia play in memory processing?

- The cerebellum and basal ganglia are parts of the brain network dedicated to implicit memory formation.
  - The cerebellum is important for storing classically conditioned memories.
  - The basal ganglia are involved in motor movement and help form procedural memories for skills.
- Many reactions and skills learned during our first four years continue

into our adult lives, but we cannot consciously remember learning these associations and skills—a phenomenon psychologists call “infantile amnesia.”

32-4 How do emotions affect our memory processing?

- Emotional arousal causes an outpouring of stress hormones, which lead to activity in the brain’s memory-forming areas. Significantly emotional events can trigger very clear *flashbulb memories.*

32-5 How do changes at the synapse level affect our memory processing?

- *Long-term potentiation (LTP)* appears to be the neural basis for learning and memory. In LTP, neurons become more efficient at releasing and sensing the presence of neurotransmitters, and more connections develop between neurons.

32-6 How do external cues, internal emotions, and order of appearance influence memory retrieval?

- External cues activate associations that help us retrieve memories; this process may occur without our awareness, as it does in *priming.*
- Returning to the same physical context or emotional state *(mood congruency)* in which we formed a memory can help us retrieve it.
- The *serial position effect* accounts for our tendency to recall best the last items (which may still be in working memory) and the first items (which we’ve spent more time rehearsing) in a list.

Multiple-Choice Questions

1. What two parts of the brain are most involved in implicit memory?

a. Frontal lobes and basal ganglia
b. Amygdala and hippocampus

c. Amygdala and cerebellum
d. Cerebellum and basal ganglia
e. Frontal lobes and hippocampus

2. Researchers studying the links among emotion, stress, and memory have discovered that

a. emotion blocks memory, and it is generally true that we are unable to recall highly emotional events.
b. excitement tends to increase the chance that an event will be remembered, but stress decreases the chance that an event will be remembered.
c. stress tends to increase the chance that an event will be remembered, but excitement decreases the chance that an event will be remembered.
d. both stress and emotion make events harder to remember.
e. both stress and emotion make events more memorable.

3. Which of the following is an example of a flashbulb memory?

a. Barry remembers an especially bright sunrise because he was by the ocean and the sunlight reflected off the water.
b. Robert remembers that correlation does not prove a cause–effect relationship because his teacher emphasized this fact over and over again.
c. Anna remembers when her father returned from an overseas military deployment because the day was very emotional for her.
d. Kris has stronger memories of her second grade teacher than she does of her third grade teacher because her second grade teacher has the same name as her neighbor.
e. Anton remembers a moment from his last homecoming dance because a strobe light seemed to freeze the scene in his imagination.

4. John has noticed that he does better on his chemistry exams when he takes them in the same seat that he sits in during class than when he sits in a different seat for exams. If he is properly prepared for each exam, then _____ may explain his difference in scores.

a. recall
b. context effects
c. explicit memory
d. the serial position effect
e. flashbulb memory

5. Which of the following is an example of the serial position effect?

a. Remembering the most important assignment you have to complete for school tomorrow
b. Remembering the skills you learned early in life, such as walking
c. Remembering the beginning and end of your grocery list, but not the items in the middle
d. Remembering the names of co-workers you met at your new job
e. Remembering where you left your cell phone when you cannot find it

Practice FRQs

1. Yesterday in your science class, the teacher's demonstration was perhaps the best science experiment you have ever seen.

- Explain the process that allows memory of the experiment to occur at the synaptic level.
- Explain the role of the hippocampus and the frontal lobes in your memory of the class.

Answer

1 point: Long-term potentiation (LTP) increases the cells' firing potential at the synapse. Page 342

1 point: The hippocampus gives the command to "save" a memory. Page 340

1 point: The frontal lobes help make the judgment about which memories from the experiment are important enough to process for long-term storage. Page 340

2. You have a friend, Rachel, who cannot remember where she left a check she had received from a relative for her birthday. She remembers having drunk several cups of tea the morning she received the check, and she remembers taking it to her bedroom. Explain how Rachel can take advantage of context-dependent memory and state-dependent memory to remember where in her bedroom she left the check.

(2 points)

Module **33 Forgetting, Memory Construction, and Improving Memory**

LEARNING TARGETS

- 33-1 Explain why we forget.
- 33-2 Discuss how misinformation, imagination, and source amnesia influence our memory construction, and describe how we decide whether a memory is real or false.
- 33-3 Analyze why reports of repressed and recovered memories have been so hotly debated.
- 33-4 Describe the reliability of young children’s eyewitness descriptions.
- 33-5 Discuss how you can use memory research findings to do better in this and other courses.

Forgetting

33-1 Why do we forget?

Amid all the applause for memory—all the efforts to understand it, all the books on how to improve it—have any voices been heard in praise of forgetting? William James (1890, p. 680) was such a voice: "If we remembered everything, we should on most occasions be as ill off as if we remembered nothing." To discard the clutter of useless or out-of-date information—last year's locker combination, our old phone number, restaurant orders already cooked and served—is surely a blessing (Nørby, 2015). The Russian memory whiz S, whom we met at the beginning of this unit, was haunted by his junk heap of memories. They dominated his consciousness. He had difficulty thinking abstractly—generalizing, organizing, evaluating. After reading a story, he could recite it but would struggle to summarize its gist.

A more recent case of a life overtaken by memory is Jill Price, whose experience has been studied by a University of California at Irvine research team, along with several dozen other cases of "highly superior autobiographical memory" (McGaugh & LePort, 2014; Parker et al., 2006). Price compares her memory to "a running movie that never stops. It's like a split screen. I'll be talking to someone and seeing something else. . . . Whenever I see a date flash on the television (or anywhere for that matter) I automatically go back to that day and remember where I was, what I was doing, what day it fell on, and on and on and on and on. It is nonstop, uncontrollable, and totally exhausting." Jill, and others like her, are prone to letting their minds get absorbed by information that, once it enters memory storage, never leaves (Patihis, 2016). A good memory is helpful, but so is the ability to forget. If a memory-enhancing pill ever becomes available, it had better not be *too* effective.

33.1).

Dan Tuffs/Getty Images

The woman who can't forget Jill Price, with writer Bart Davis, told her story in a 2008 published memoir. Price remembers every day of her life since age 14 with detailed clarity, including both the joys and the hurts. Researchers have identified enlarged brain areas in people with super memory (Ally et al., 2013; LePort et al., 2012).

> “*Amnesia seeps into the crevices of our brains, and amnesia heals.*”
>
> *Joyce Carol Oates, “Words Fail, Memory Blurs, Life Wins,” 2001*

More often, however, our unpredictable memory dismays and frustrates us. Memories are quirky. My [DM's] own memory can easily call up such episodes as that wonderful first kiss with the woman I love, or trivial facts like the air mileage from London to Detroit. Then it abandons me when I discover I have failed to encode, store, or retrieve a student's name or where I left my sunglasses.

As we process information, we sift, change, or lose most of it (**Figure 33.1**).

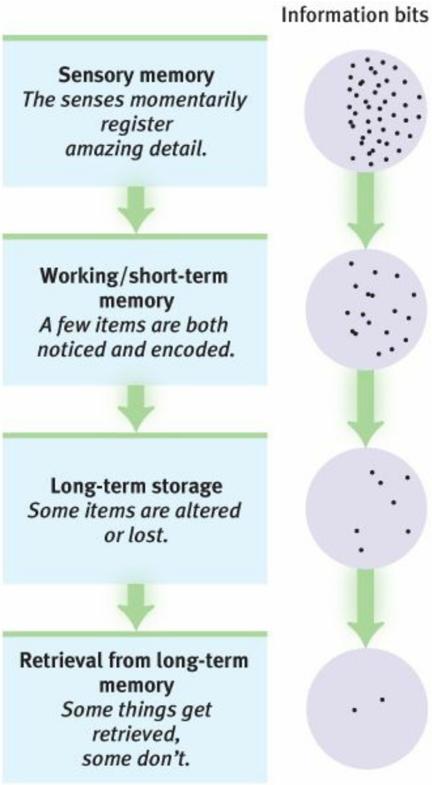
Information bits
Sensory memory
The senses momentarily register amazing detail.
Working/short-term memory
A few items are both noticed and encoded.
Long-term storage
Some items are altered or lost.
Retrieval from long-term memory
Some things get retrieved, some don’t.

Figure 33.1
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Figure 33.1 When do we forget?

Forgetting can occur at any memory stage. When we process information, we filter, alter, or lose much of it.

Forgetting and the Two-Track Mind

For some, memory loss is severe and permanent. Consider Henry Molaison (or H. M., as he was known until his 2008 death). Surgeons removed much of his hippocampus in order to stop persistent seizures. This resulted “in severe disconnection of the remaining hippocampus” from the rest of the brain (Annese et al., 2014). For his remaining 55 years, Molaison was unable to form new conscious memories. He was, as before his surgery, intelligent and did daily crossword puzzles. Yet, reported neuroscientist Suzanne Corkin (2005, 2013), “I’ve known H. M. since 1962, and he still doesn’t know who I am.” For about half a minute he could keep something in mind, enough to carry on a conversation. When distracted, he would lose what was just said or what had just occurred. Without the neural tissue for turning new information into long-term memories, he never could name the current president of the United States (Ogden, 2012).

John Gibbins/ZUMA Press/Newscom

Studying a famous brain Jacopo Annese and other scientists at the University of California, San Diego’s Brain Observatory are preserving Henry Molaison’s brain for the benefit of future generations. Their careful work will result in a freely available online brain atlas.

Molaison suffered from **anterograde amnesia**—he could recall his past, but he could not form new memories. (Those who cannot recall their past—the old information stored in long-term memory—suffer from **retrograde amnesia**.)

anterograde amnesia

an inability to form new memories.

retrograde amnesia

an inability to retrieve information from one’s past.

Neurologist Oliver Sacks (1985, pp. 26–27) described another patient, Jimmie, who had anterograde amnesia resulting from brain damage. Jimmie had no memories—thus, no sense of elapsed time—beyond his injury in 1945.

When Jimmie gave his age as 19, Sacks set a mirror before him: “Look in the mirror and tell me what you see. Is that a 19-year-old looking out from the mirror?"

Jimmie turned ashen, gripped the chair, cursed, then became frantic: "What's going on? What's happened to me? Is this a nightmare? Am I crazy? Is this a joke?" When his attention was diverted to some children playing baseball, his panic ended, the dreadful mirror forgotten.

Sacks showed Jimmie a photo from *National Geographic*. "What is this?" he asked.

"It's the Moon," Jimmie replied.

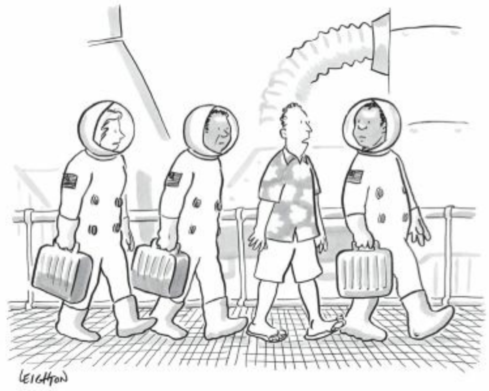
"No, it's not," Sacks answered. "It's a picture of the Earth taken from the Moon."

"Doc, you're kidding! Someone would've had to get a camera up there!"

"Naturally."

"Hell! You're joking—how the hell would you do that?" Jimmie's wonder was that of a bright young man from the 1940s, amazed by his travel back to the future.

Careful testing of these unique people reveals something even stranger: Although incapable of recalling new facts or anything they have done recently, Molaison, Jimmie, and others with similar conditions can learn nonverbal tasks. Shown hard-to-find figures in pictures (in the *Where's Waldo?* series), they can quickly spot them again later. They can find their way to the bathroom, though without being able to tell you where it is. They can learn to read mirror-image writing or do a jigsaw puzzle, and they have even learned complicated *procedural* job skills (Schacter, 1992, 1996; Xu & Corkin, 2001). They can be classically conditioned. However, *they do all these things with no awareness of having learned them*. "Well, this is strange," Molaison said, after demonstrating his nondeclarative memory of skillful mirror tracing. "I thought that would be difficult. But it seems as though I've done it quite well" (Shapin, 2013).



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"Oh, is that today?"

Molaison and Jimmie lost their ability to form new explicit memories, but their automatic processing ability remained intact. Like Alzheimer's patients, whose *explicit* memories for new people and events are lost, they could form new *implicit* memories (Lustig & Buckner, 2004). These patients can learn *how* to do something, but they will have no conscious recall of learning their new skill. Such sad cases confirm that we have two distinct memory systems, controlled by different parts of the brain.

For most of us, forgetting is a less drastic process. Let's consider some of the reasons we forget.

Encoding Failure

Much of what we sense we never notice, and what we fail to encode, we will never remember (**Figure 33.2**). The English novelist and critic C. S. Lewis (1967, p. 107) described the enormity of what we never encode:

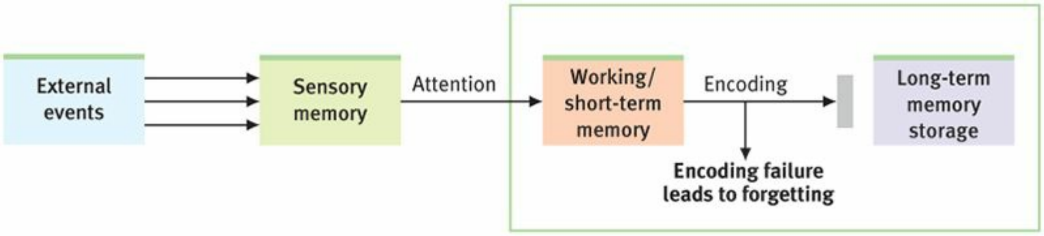
External events
Sensory memory
Attention
Working/ short-term memory
Encoding
Long-term memory storage
Encoding failure leads to forgetting

Figure 33.2
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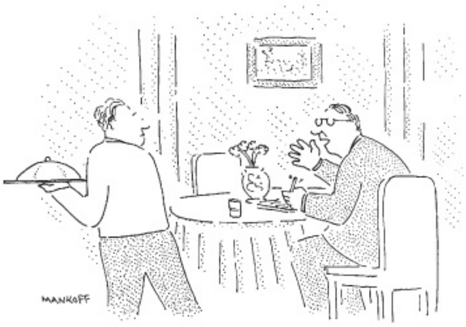
Figure 33.2 Forgetting as encoding failure

We cannot remember what we have not encoded.

> [We are] bombarded every second by sensations, emotions, thoughts . . . nine-tenths of which [we] must simply ignore. The past [is] a roaring cataract of billions upon billions of such moments: Any one of them too complex to grasp in its entirety, and the aggregate beyond all imagination. . . . At every tick of the clock, in every inhabited part of the world, an unimaginable richness and variety of "history" falls off the world into total oblivion.

Age can affect encoding efficiency. The brain areas that jump into action when young adults encode new information are less responsive in older adults. This slower encoding helps explain age-related memory decline (Grady et al., 1995).



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"Waiter, I'd like to order, unless I've eaten, in which case bring me the check."

But no matter how young we are, we selectively attend to few of the myriad sights and sounds continually bombarding us. Consider: You have surely seen the Apple logo thousands of times. Can you draw it? In one study, only 1 of 85 UCLA students (including 52 Apple users) could do so accurately (Blake et al., 2015). Most people also struggle to recall details of other familiar objects, such as their country's coins (Nickerson & Adams, 1979; Richardson, 1993). Without encoding effort, many potential memories never form.

Storage Decay

Even after encoding something well, we sometimes later forget it. To study the durability of stored memories, Ebbinghaus (1885) learned more lists of nonsense syllables and measured how much he retained when relearning each list, from 20 minutes to 30 days later. The result, confirmed by later experiments, was his famous forgetting curve: *The course of forgetting is initially rapid, then levels off with time* (**Figure 33.3**; Wixted & Ebbesen, 1991). Harry Bahrick (1984) found a similar forgetting curve for Spanish vocabulary learned in school. Compared with those just completing a high school or college Spanish course, people 3 years out of school had forgotten much of what they had learned (**Figure 33.4**). However, what people remembered then, they still remembered 25 and more years later. Their forgetting had leveled off.

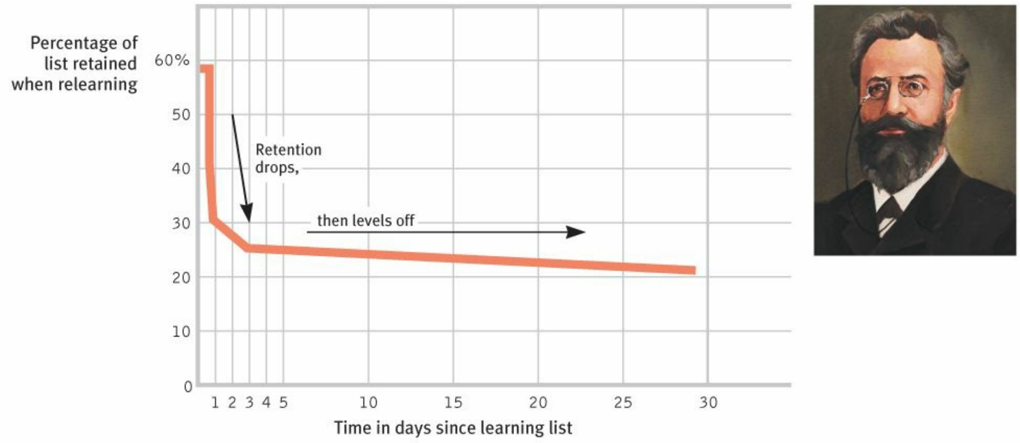

Figure 33.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Ebbinghaus, 1885.

Figure 33.3 Ebbinghaus' forgetting curve

After learning lists of nonsense syllables, such as YOX and JIH, Ebbinghaus studied how much he retained up to 30 days later. He found that memory for novel information fades quickly, then levels out.

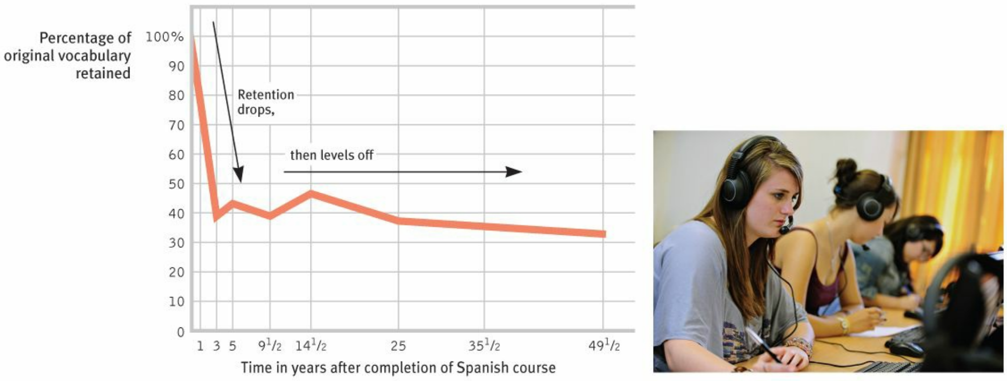

Figure 33.4
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Photo: Jon Parker Lee/Alamy

Figure 33.4 The forgetting curve for Spanish learned in school

Compared with people just completing a Spanish course, those 3 years out of the course remembered much less (on a vocabulary recognition test). Compared with the 3-year group, however, those who studied Spanish even longer ago did not forget much more.

One explanation for these forgetting curves is a gradual fading of the physical memory trace. Cognitive neuroscientists are getting closer to solving the mystery of the physical storage of memory and are increasing our understanding of how memory storage could decay. Like books you can't find in your high school library, memories may be inaccessible for many reasons. Some were never acquired (not encoded). Others were discarded (stored memories decay). And others are out of reach because we can't retrieve them.

Retrieval Failure

Often, forgetting is not memories faded but memories unretrieved. We store in long-term memory what's important to us or what we've rehearsed. But sometimes important events defy our attempts to access them (**Figure 33.5**). How frustrating when a name lies poised on the tip of our tongue, just beyond reach. Given retrieval cues ("*It begins with an M*"), we may easily retrieve the elusive memory. Retrieval problems contribute to the occasional memory failures of older adults, who more frequently are frustrated by tip-of-the-tongue forgetting (Abrams, 2008; Salthouse & Mandell, 2013).

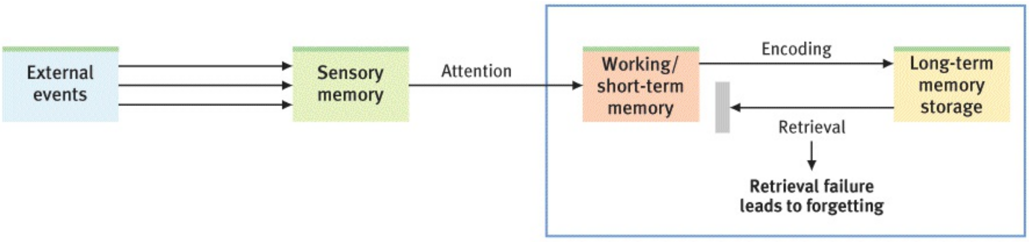

Figure 33.5
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Figure 33.5 Retrieval failure

Sometimes even stored information cannot be accessed, which leads to forgetting.

Do you recall the sentence about the attacked swimmer that we asked you to remember in Module 31's discussion of making information personally meaningful? If not, does the word *shark* serve as a retrieval cue? Experiments show that *shark* (likely what you visualized) more readily retrieves the image you stored than does the sentence's actual word, *fish* (Anderson et al., 1976). (The sentence was "*The fish attacked the swimmer*.")

But retrieval problems occasionally stem from interference and even from motivated forgetting.

Interference

Flip It Video: Retroactive and Proactive Interference

As you collect more and more information, your mental attic never fills, but it does get cluttered. Your brain tries to keep things tidy: As you, for example, use a new password, it weakens your memory of competing old passwords (Wimber et al., 2015). But sometimes the clutter wins, and new and old learning collide. **Proactive** *(forward-acting)* **interference** occurs when prior learning disrupts your recall of new information. If you buy a new combination lock, your well-rehearsed old combination may interfere with your retrieval of the new one.

proactive interference

the forward-acting disruptive effect of older learning on the recall of *new* information.

Retroactive *(backward-acting)* **interference** occurs when new learning disrupts recall of old information. If someone sings new lyrics to the tune of an old song, you may have trouble remembering the original words. It is rather like a second stone tossed in a pond, disrupting the waves rippling out from the first.

retroactive interference

the backward-acting disruptive effect of newer learning on the recall of *old* information.

Information presented in the hour before sleep suffers less retroactive interference because the opportunity for interfering events is minimized (Mercer, 2015). Researchers John Jenkins and Karl Dallenbach (1924) first discovered this in a now-classic experiment. Day after day, two people each learned some nonsense syllables, then tried to recall them after up to eight hours of being awake or asleep at night. As **Figure 33.6** shows, forgetting occurred more rapidly after being awake and involved with other activities. The investigators surmised that “forgetting is not so much a matter of the decay of old impressions and associations as it is a matter of interference, inhibition, or obliteration of the old by the new” (1924, p. 612).

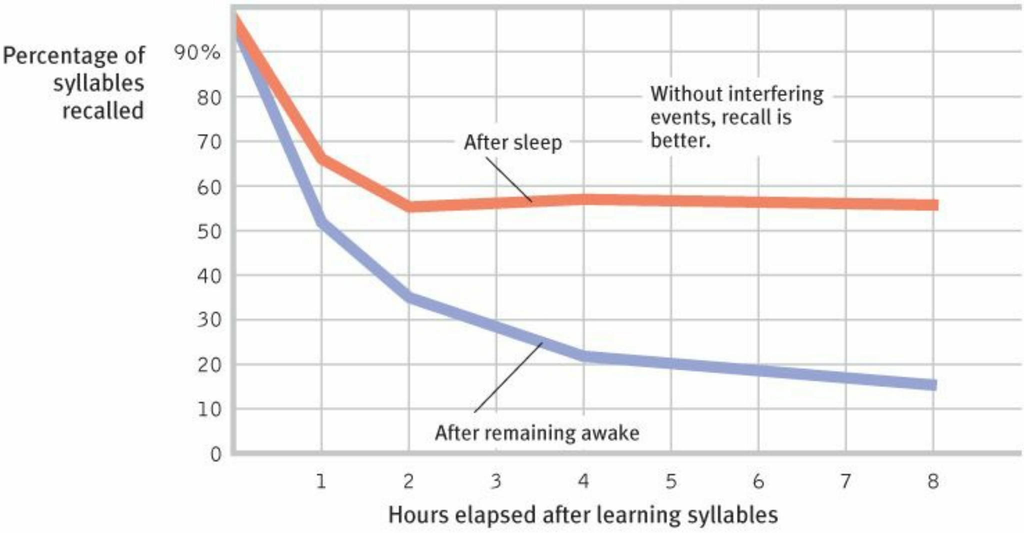

Figure 33.6
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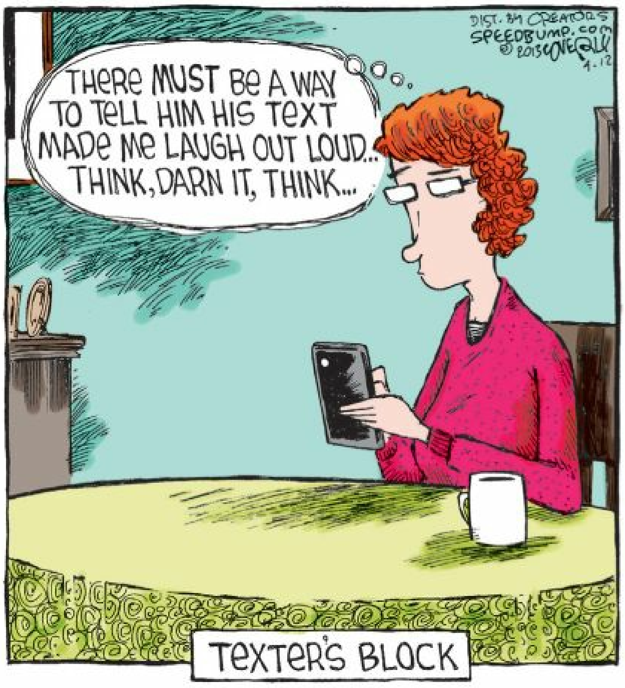
Data from Jenkins & Dallenbach, 1924.

Figure 33.6 Retroactive interference

More forgetting occurred when a person stayed awake and experienced other new material.


THERE MUST BE A WAY TO TELL HIM HIS TEXT MADE ME LAUGH OUT LOUD... THINK, DARN IT, THINK...
DIST. BY CREATORS SPEEDBUMP.COM © 2013 COVERLY 4-12
TEXTER'S BLOCK

© Dave Coverly/speedbump.com

The hour before sleep is a good time to commit information to memory (Scullin & McDaniel, 2010). If you're considering learning *while* sleeping, forget it. We have little memory for information played aloud in the room during sleep, although the ears do register it (Wood et al., 1992).

AP® EXAM TIP

Students frequently get proactive and retroactive interference confused on the AP® exam. Can you differentiate these terms by definition and example?

Old and new learning do not always compete with each other, of course. Previously learned information (Latin) often facilitates our learning of new information (French). This phenomenon is called *positive transfer*.

Motivated Forgetting

To remember our past is often to revise it. Years ago, the huge cookie jar in my [DM’s] kitchen was jammed with freshly baked chocolate chip cookies. Still more were cooling across racks on the counter. Twenty-four hours later, not a crumb was left. Who had taken them? During that time, my wife, three children, and I were the only people in the house. So while memories were still fresh, I conducted a little memory test. Andy admitted wolfing down as many as 20. Peter thought he had eaten 15. Laura guessed she had stuffed her then-6-year-old body with 15 cookies. My wife, Carol, recalled eating 6, and I remembered consuming 15 and taking 18 more to the office. We sheepishly accepted responsibility for 89 cookies. Still, we had not come close; there had been 160.

Fuse/Getty Images

Why do our memories fail us? This happens in part because memory is an “unreliable, self-serving historian” (Tavris & Aronson, 2007, p. 6). Consider one study, in which researchers told some participants about the benefits of frequent toothbrushing. Those individuals then recalled (more than others did) having frequently brushed their teeth in the preceding two weeks (Ross et al., 1981).

So why were my family and I so far off in our estimates of the cookies we had eaten? Was it an *encoding* problem? (Did we just not notice what we had eaten?) Was it a storage problem? (Might our memories of cookies, like Ebbinghaus’ memory of nonsense syllables, have melted away almost as fast as the cookies themselves?) Or was the information still intact but not *retrievable* because it would be embarrassing to remember?[1]

Sigmund Freud might have argued that our memory systems self-censored this information. He proposed that we **repress** painful or unacceptable memories to protect our self-concept and to minimize anxiety. But the repressed memory lingers, he believed, and can be retrieved by some later cue or during therapy. Repression was central to

Freud’s psychoanalytic theory of personality (more on that in Module 55) and remains a popular idea. One Norwegian study found that educated people tend to believe in repressed memories more than do those with less formal education (Magnussen et al., 2006). Indeed, an American study revealed that 81 percent of university students, and 60 to 90 percent of therapists (depending on their perspective), believe that “traumatic memories are often repressed” (Patihis et al., 2014a,b). However, most memory researchers think repression rarely, if ever, occurs. People succeed in forgetting unwanted neutral information (yesterday’s parking place), but it’s harder to forget emotional events (Payne & Corrigan, 2007). Thus, we may have intrusive memories of the very same traumatic experiences we would most like to forget.

repression

in psychoanalytic theory, the basic defense mechanism that banishes from consciousness anxiety-arousing thoughts, feelings, and memories.

Stringer/European Pressphoto Agency/Lages/PORTUGAL/Newscom

Do people vividly remember—or repress—traumatic experiences? Imagine yourself several hours into Flight AT236 from Toronto to Lisbon. A fractured fuel line begins leaking. Soon the engines go silent and primary electrical power is lost. In the eerie silence, the pilots instruct you and the other terrified passengers to don life jackets, and, when hearing the countdown to ocean impact, to assume a brace position. After minutes of descent the pilot declares above the passengers’ screams and prayers, “About to go into the water.” Death awaits.

But no! “We have a runway! We have a runway! Brace! Brace! Brace!” The plane makes a hard landing at an Azores airbase, averting death for you and the 305 other passengers and crew.

Among the passengers thinking “I’m going to die” was psychologist Margaret McKinnon. Seizing the opportunity, she tracked down 15 of her fellow passengers to test their trauma memories. Did they repress the experience? To the contrary, all exhibited vivid, detailed memories. With trauma comes not repression, but, far more often, “robust” memory (McKinnon et al., 2015).

Check Your Understanding

Ask Yourself

- Most people, especially as they grow older, wish for a better memory. Is that true of you? Or do you more often wish you could discard old memories?

Test Yourself

- What are three ways we forget, and how does each of these happen?
- You will experience less ___________ (proactive/retroactive) interference if you learn new material in the hour before sleep than you will if you learn it before turning to another subject.
- Freud believed that we ___________ unacceptable memories to minimize anxiety.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Memory Construction Errors

33-2 How do misinformation, imagination, and source amnesia influence our memory construction? How do we decide whether a memory is real or false?

Nearly two-thirds of Americans agree: “Human memory works like a video camera, accurately recording the events we see and hear so that we can review and inspect them later” (Simons & Chabris, 2011). Actually, memory is not so precise. Like scientists who infer a dinosaur’s appearance from its remains, we infer our past from stored information plus what we later imagined, expected, saw, and heard. We don’t just retrieve memories, we reweave them.

Our memories are like Wikipedia pages, capable of continuous revision. When we “replay” a memory, we often replace the original with a slightly modified version, rather like what happens in the telephone game, as a whispered message gets progressively altered when passed from person to person (Hardt et al., 2010). (Memory researchers call this **reconsolidation**.) So, in a sense, said Joseph LeDoux (2009), “your memory is only as good as your last memory. The fewer times you use it, the more pristine it is.” This means that, to some degree, “all memory is false” (Bernstein & Loftus, 2009b).

reconsolidation

a process in which previously stored memories, when retrieved, are potentially altered before being stored again.

Despite knowing all this, I [DM] recently rewrote my own past. It happened at an international conference, where memory researcher Elizabeth Loftus (2012) was demonstrating how memory works. Loftus showed us a handful of individual faces that we were later to identify, as if in a police lineup. Then she showed us some pairs of faces, one face we had seen earlier and one we had not, and asked us to identify the one we had seen. But one pair she had slipped in included *two* new faces, one of which was rather *like* a face we had seen earlier. Most of us understandably but wrongly identified this face as one we had previously seen. To climax the demonstration, she showed us the originally seen face and the previously chosen wrong face and asked us to choose the original face we had seen. Most of us picked the wrong face! As a result of our memory reconsolidation, we—an audience of psychologists who should have known better—had replaced the original memory with a false memory.

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"Someday we'll look back at this time in our lives and be unable to remember it."

Clinical researchers have experimented with memory reconsolidation. People recalled a traumatic or negative experience and then had the reconsolidation of that memory disrupted, with a drug or brief, painless electroconvulsive shock (Kroes et al., 2014; Lonergan et al., 2013). Someday it might become possible to erase your memory of a specific traumatic experience—by reactivating your memory and then disrupting its storage in this way. Would you wish for this? If brutally assaulted, would you welcome having your memory of the attack and its associated fears deleted?

Misinformation and Imagination Effects

In more than 200 experiments involving more than 20,000 people, Loftus has shown how eyewitnesses reconstruct their memories after a crime or accident. In one important study, two groups of people watched a film clip of a traffic accident and then answered questions about what they had seen (Loftus & Palmer, 1974). Those asked, “About how fast were the cars going when they *smashed* into each other?” gave higher speed estimates than those asked, “About how fast were the cars going when they *hit* each other?” A week later, when asked whether they recalled seeing any broken glass, people who had heard *smashed* were more than twice as likely to report seeing glass fragments (**Figure 33.7**). In fact, the clip showed no broken glass.

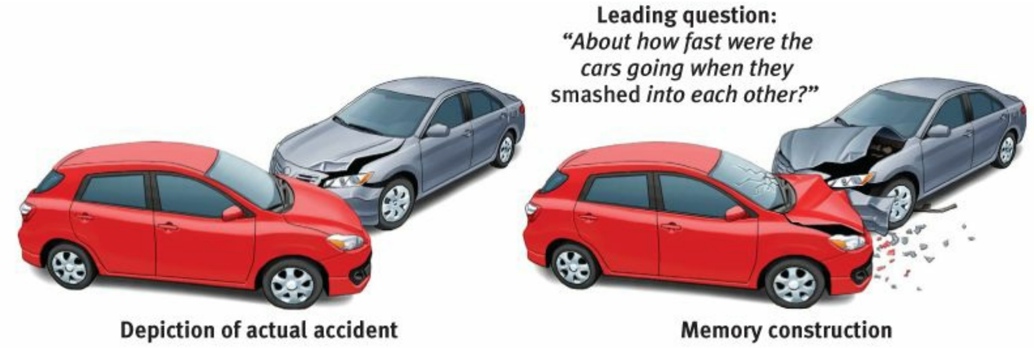

Leading question:
“About how fast were the cars going when they smashed *into each other?”*
Depiction of actual accident
Memory construction

Figure 33.7
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 33.7 Memory construction

In this experiment, people viewed a film clip of a car accident. Those who later were asked a leading question recalled a more serious accident than they had witnessed (Loftus & Palmer, 1974).

Flip It Video: Misinformation Effect and Source Amnesia

In many follow-up experiments around the world, others have witnessed an event, received or not received misleading information about it, and then taken a memory test. The repeated result is a **misinformation effect:** When exposed to subtle misleading information, we may misremember (Loftus et al., 1992). A yield sign becomes a stop sign, hammers become screwdrivers, Coke cans become peanut cans. Breakfast cereal becomes eggs. And a clean-shaven man morphs into a man with a mustache.

misinformation effect

occurs when misleading information has distorted one’s memory of an event.

So powerful is the misinformation effect that it can influence later attitudes and behaviors (Bernstein & Loftus, 2009a). One experiment falsely suggested to some Dutch university students that, as children, they became ill after eating spoiled egg salad (Geraerts et al., 2008). After absorbing that suggestion, they were less likely to eat egg salad sandwiches, both immediately and four months later.

> “*Memory is insubstantial. Things keep replacing it. Your batch of snapshots will both fix and ruin your memory. . . . You can’t remember anything from your trip except the wretched collection of snapshots.*”
>
> *Annie Dillard, “To Fashion a Text,” 1988*

Even repeatedly *imagining* nonexistent actions and events can create false memories. In one study, Canadian university students were asked to recall two events from their past. One event actually happened; the other was a false event that involved committing a crime, such as assaulting someone with a weapon. Initially, none of the lawful students remembered breaking the law. But after repeated interviewing, 70 percent of students reported a detailed false memory of having committed the crime (Shaw & Porter, 2015).

Misinformation and imagination effects occur partly because visualizing something and actually perceiving it activate similar brain areas (Gonsalves et al., 2004). Imagined events also later seem more familiar, and familiar things seem more real. The more vividly we can imagine things, the more likely they are to become memories (Loftus, 2001; Porter et al., 2000).

Evan Agostini/AP Images

Was Alexander Hamilton a U.S. president? Sometimes our mind tricks us into misremembering dates, places, and names. This often happens because we misuse familiar information. In one study, many people mistakenly recalled Alexander Hamilton—the subject of a popular Broadway musical whose face also appears on the U.S. $10 bill—as a U.S. president (Roediger & DeSoto, 2016).

Digitally altered photos have also produced this *imagination inflation.* In experiments, researchers have altered photos from a family album to show some family members taking a hot air balloon ride. After viewing these photos (rather than photos showing just the balloon), children reported more false memories and indicated high confidence in those memories. When interviewed several days later, they reported even richer details of their false memories (Strange et al., 2008; Wade et al., 2002). Similarly, when *Slate* magazine readers in 2012 were shown a doctored photo of U.S. President Barack Obama and Iranian President Mahmoud Ahmadinejad shaking hands, 26 percent recalled the event—despite it never having happened (Frenda et al., 2013).

In British and Canadian university surveys, one-fourth of students have reported autobiographical memories that they later realized were not accurate (Foley, 2015; Mazzoni et al., 2010). I [DM] empathize. For decades, my cherished earliest memory was of my parents getting off the bus and walking to our house, bringing my baby brother home from the hospital. When, in middle age, I shared that memory with my father, he assured me they did *not* bring their newborn home on the Seattle Transit System. The human mind, it seems, comes with built-in Photoshopping software. The moral: Don’t believe everything you remember.

Source Amnesia

What is the frailest part of a memory? Its source. We may recognize someone but have no idea where we have seen the person. We may tell a friend some gossip, only to learn we got the news from the friend. We may dream an event and later be unsure whether it really happened. Famed child psychologist Jean Piaget was startled as an adult to learn that a vivid, detailed memory from his childhood—a nursemaid’s thwarting his kidnapping—was utterly false. He apparently constructed the memory from repeatedly hearing the story (which his nursemaid, after undergoing a religious conversion, later confessed had never happened). In attributing his “memory” to his own experiences, rather than to his nursemaid’s stories, Piaget exhibited **source amnesia** (also called *source misattribution*). Misattribution is at the heart of many false memories. Authors, songwriters, and stand-up comedians sometimes suffer from it. They think an idea came from their own creative imagination, when in fact they are unintentionally plagiarizing something they earlier read or heard.

source amnesia
faulty memory for how, when, or where information was learned or imagined. (Also called *source misattribution.*) Source amnesia, along with the misinformation effect, is at the heart of many false memories.

Famous psychologists and artists aren’t the only ones to experience source amnesia. Preschoolers interacted with “Mr. Science,” who engaged them in activities such as blowing up a balloon with baking soda and vinegar (Poole & Lindsay, 1995, 2001). Three months later, on three successive days, their parents read them a story describing some things the children had experienced with Mr. Science and some they had not. When a new interviewer asked what Mr. Science had done with them—“Did Mr. Science have a machine with ropes to pull?”—4 in 10 children spontaneously recalled him doing things that had happened only in the story.

Patrick Andrade/Polaris Images/Newscom

“Lyin’ Brian”? Or a victim of false memory? In 2015, *NBC Nightly News* anchor Brian Williams recounted a story about traveling in a military helicopter that was hit with a rocket-propelled grenade. But the event never happened as he described. The public branded him as a liar, leading his bosses to fire him. Several memory researchers had a different opinion. “I think a lot of people don’t appreciate the extent to which false memories can happen even when we are extremely confident in the memory,” noted psychologist Christopher Chabris (2015).

Source amnesia also helps explain **déjà vu** (French for “already seen”). Two-thirds of us have experienced this fleeting, eerie sense that “I’ve been in this exact situation before.” The key to déjà vu seems to be familiarity with a stimulus without a clear idea of where we encountered it before (Brown & Marsh, 2009; Cleary, 2008). Normally, we experience a feeling of *familiarity* (thanks to temporal lobe processing) before we consciously remember details (thanks to hippocampus and frontal lobe processing). When these functions (and brain regions) are out of sync, we may experience a feeling of familiarity without conscious recall. Our amazing brains try to make sense of such an improbable situation, and we get an eerie feeling that we’re reliving some earlier part of our life. Our source amnesia forces us to do our best to make sense of an odd moment.

déjà vu

that eerie sense that “I’ve experienced this before.” Cues from the current situation may unconsciously trigger retrieval of an earlier experience.

> “*Do you ever get that strange feeling of vujà dé? Not déjà vu; vujà dé. It’s the distinct sense that, somehow, something just happened that has never happened before. Nothing seems familiar. And then suddenly the feeling is gone. Vujà dé.*”
>
> *Comedian George Carlin (1937–2008), in* Funny Times, *December 2001*

Discerning True and False Memories

Since memory is reconstruction as well as reproduction, we can’t be sure whether a memory is real by how real it feels. Much as perceptual illusions may seem like real perceptions, unreal memories *feel* like real memories. Because the misinformation effect and source amnesia happen outside our awareness, it is hard to separate false memories from real ones (Schooler et al., 1986). Perhaps you can recall describing a childhood experience to a friend and filling in memory gaps with reasonable guesses. We all do it. After more retellings, those guessed details—now absorbed into your memory—may feel as real as if you had actually observed them (Roediger et al., 1993). False memories, like fake diamonds, seem so real.

False memories can be persistent. Imagine that we were to read aloud a list of words such as *candy, sugar, honey,* and *taste.* Later, we ask you to recognize the presented words from a larger list. If you are at all like the people tested by Henry Roediger and Kathleen McDermott (1995), you would err three out of four times—by falsely remembering a nonpresented similar word, such as *sweet.* We more easily remember the gist than the words themselves.

TRY THIS

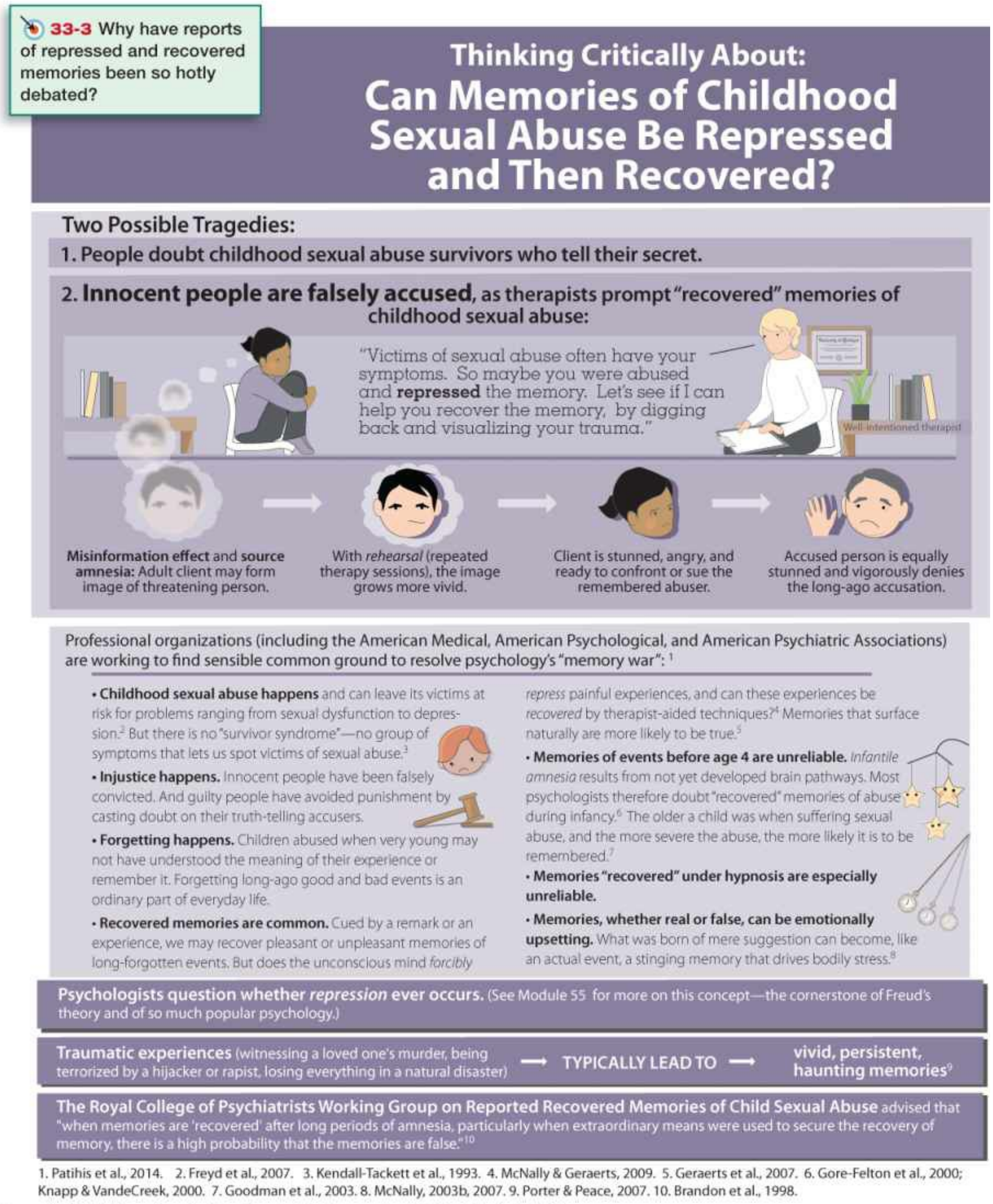
Do you remember, from Module 31, the six words we suggested you read to a friend—and later ask them to recall? How many of these words can *you* now recall? Of these, how many are high-imagery words? How many are low-imagery? (You can check your list against the six words at the foot of this page.)[2]

Memory construction can help us understand why some people have been sent to prison for crimes they never committed. Of 337 people who were later proven not guilty by DNA testing, 71 percent had been convicted because of faulty eyewitness identification (Innocence Project, 2015; Smalarz & Wells, 2015). It explains why "hypnotically refreshed" memories of crimes so easily incorporate errors, some of which originate with the hypnotist's leading questions ("*Did you hear loud noises*?"). It explains why dating partners who fell in love have *over*estimated their first impressions of one another ("*It was love at first sight*"), while those who broke up *under*estimated their earlier liking ("*We never really clicked*") (McFarland & Ross, 1987). And it explains why people asked how they felt 10 years ago about marijuana or gender issues recalled attitudes closer to their current views than to the views they had actually reported a decade earlier (Markus, 1986). People tend to recall having always felt as they feel today (Mazzoni & Vannucci, 2007; and recall from Module 4 our tendency to hindsight bias).

> “*It isn't so astonishing, the number of things I can remember, as the number of things I can remember that aren't so.*”
>
> *Author Mark Twain (1835–1910)*

One research team interviewed 73 ninth-grade boys and then reinterviewed them 35 years later. When asked to recall how they had reported their attitudes, activities, and experiences, most men recalled their ninth-grade statements at a rate no better than chance. Only 1 in 3 now remembered receiving physical punishment, though as ninth-graders 82 percent had said they had (Offer et al., 2000). As George Vaillant (1977, p. 197) noted after following adult lives through time, "It is all too common for caterpillars to become butterflies and then to maintain that in their youth they had been little butterflies. Maturation makes liars of us all." Memory construction errors also seem to be at work in many "recovered" memories of childhood abuse. See Thinking Critically About: Can

Memories of Childhood Sexual Abuse Be Repressed and Then Recovered?



33-3 Why have reports of repressed and recovered memories been so hotly debated?

Thinking Critically About:

Can Memories of Childhood Sexual Abuse Be Repressed and Then Recovered?

Two Possible Tragedies:

1. People doubt childhood sexual abuse survivors who tell their secret.

2. **Innocent people are falsely accused**, as therapists prompt "recovered" memories of childhood sexual abuse:

"Victims of sexual abuse often have your symptoms. So maybe you were abused and **repressed** the memory. Let's see if I can help you recover the memory, by digging back and visualizing your trauma."

Misinformation effect and **source amnesia:** Adult client may form image of threatening person. → With *rehearsal* (repeated therapy sessions), the image grows more vivid. → Client is stunned, angry, and ready to confront or sue the remembered abuser. → Accused person is equally stunned and vigorously denies the long-ago accusation.

Professional organizations (including the American Medical, American Psychological, and American Psychiatric Associations) are working to find sensible common ground to resolve psychology's "memory war":[1]

- **Childhood sexual abuse happens** and can leave its victims at risk for problems ranging from sexual dysfunction to depression.[2] But there is no "survivor syndrome"—no group of symptoms that lets us spot victims of sexual abuse.[3]
- **Injustice happens.** Innocent people have been falsely convicted. And guilty people have avoided punishment by casting doubt on their truth-telling accusers.
- **Forgetting happens.** Children abused when very young may not have understood the meaning of their experience or remember it. Forgetting long-ago good and bad events is an ordinary part of everyday life.
- **Recovered memories are common.** Cued by a remark or an experience, we may recover pleasant or unpleasant memories of long-forgotten events. But does the unconscious mind *forcibly repress* painful experiences, and can these experiences be *recovered* by therapist-aided techniques?[4] Memories that surface naturally are more likely to be true.[5]
- **Memories of events before age 4 are unreliable.** *Infantile amnesia* results from not yet developed brain pathways. Most psychologists therefore doubt "recovered" memories of abuse during infancy.[6] The older a child was when suffering sexual abuse, and the more severe the abuse, the more likely it is to be remembered.[7]
- **Memories "recovered" under hypnosis are especially unreliable.**
- **Memories, whether real or false, can be emotionally upsetting.** What was born of mere suggestion can become, like an actual event, a stinging memory that drives bodily stress.[8]

Psychologists question whether *repression* ever occurs. (See Module 55 for more on this concept—the cornerstone of Freud's theory and of so much popular psychology.)

Traumatic experiences (witnessing a loved one's murder, being terrorized by a hijacker or rapist, losing everything in a natural disaster) → TYPICALLY LEAD TO → **vivid, persistent, haunting memories**[9]

The Royal College of Psychiatrists Working Group on Reported Recovered Memories of Child Sexual Abuse advised that "when memories are 'recovered' after long periods of amnesia, particularly when extraordinary means were used to secure the recovery of memory, there is a high probability that the memories are false."[10]

1. Patihis et al., 2014. 2. Freyd et al., 2007. 3. Kendall-Tackett et al., 1993. 4. McNally & Geraerts, 2009. 5. Geraerts et al., 2007. 6. Gore-Felton et al., 2000; Knapp & VandeCreek, 2000. 7. Goodman et al., 2003. 8. McNally, 2003b, 2007. 9. Porter & Peace, 2007. 10. Brandon et al., 1998.

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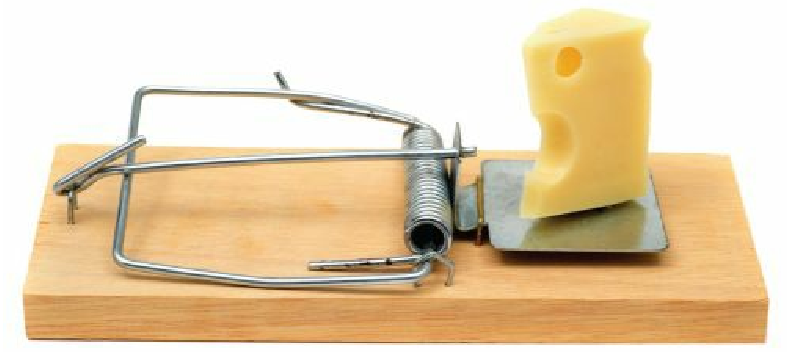
Children's Eyewitness Recall

33-4 How reliable are young children's eyewitness descriptions?

If memories can be sincere, yet sincerely wrong, how can jurors decide cases in which children's memories of sexual abuse are the only evidence? "It would be truly awful to ever lose sight of the enormity of child abuse," observed Stephen Ceci (1993). Yet Ceci and Maggie Bruck's (1993, 1995) studies of children’s memories have made them aware of how easily children’s memories can be molded. For example, they asked 3-year-olds to show on anatomically correct dolls where a pediatrician had touched them. Of the children who had not received genital examinations, 55 percent pointed to either genital or anal areas.

In other experiments, the researchers studied the effect of suggestive interviewing techniques (Bruck & Ceci, 1999, 2004). In one study, children chose a card from a deck of possible happenings, and an adult then read the card to them. For example, “Think real hard, and tell me if this ever happened to you. Can you remember going to the hospital with a mousetrap on your finger?” In interviews, the same adult repeatedly asked children to think about several real and fictitious events. After 10 weeks of this, a new adult asked the same question. The stunning result: 58 percent of preschoolers produced false (often vivid) stories regarding one or more events they had never experienced (Ceci et al., 1994). Here’s one:

> My brother Colin was trying to get Blowtorch [an action figure] from me, and I wouldn’t let him take it from me, so he pushed me into the wood pile where the mousetrap was. And then my finger got caught in it. And then we went to the hospital, and my mommy, daddy, and Colin drove me there, to the hospital in our van, because it was far away. And the doctor put a bandage on this finger.



Darren Matthews/Alamy

Given such detailed stories, professional psychologists who specialize in interviewing children could not reliably separate the real memories from the false ones. Nor could the children themselves. The above child, reminded that his parents had told him several times that the mousetrap incident never happened—that he had imagined it—protested, “But it really did happen. I remember it!” Unfortunately, this type of error is common. In one analysis of eyewitness data from over 20,000 participants, children regularly identified innocent suspects as guilty (Fitzgerald & Price, 2015). “[The] research,” said Ceci (1993), “leads me to worry about the possibility of false allegations. It is not a tribute to one’s scientific integrity to walk down the middle of the road if the data are more to one side.”

FYI

Like children (whose frontal lobes have not fully matured), older adults—especially those whose frontal lobe functioning has declined—are more susceptible than young adults to false memories. This makes older adults more vulnerable to scams, as when a repair person overcharges by falsely claiming, “I told you it would cost x, and you agreed to pay” (Jacoby et al., 2005; Jacoby & Rhodes, 2006; Roediger & Geraci, 2007; Roediger & McDaniel, 2007).

Children can, however, be accurate eyewitnesses. When questioned about their experiences in neutral words they understood, children often accurately recalled what happened and who did it (Brewin & Andrews, 2016; Goodman, 2006). When interviewers used less suggestive, more effective techniques, even 4- to 5-year-old children produced more accurate recall (Holliday & Albon, 2004; Pipe et al., 2004). Children were especially accurate when they had not talked with involved adults prior to the interview and when their disclosure was made in a first interview with a neutral person who asked nonleading questions.

✓ Check Your Understanding

Ask Yourself

- Can you think of an instance when you were sure you remembered something, only to discover later that your memory—or some aspect of it—was false?

Test Yourself

- What—given the commonness of source amnesia—might life be like if we remembered all our waking experiences and all our dreams?
- Imagine being a jury member in a trial for a parent accused of sexual abuse based on a recovered memory. What insights from memory research should you offer the jury?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Improving Memory

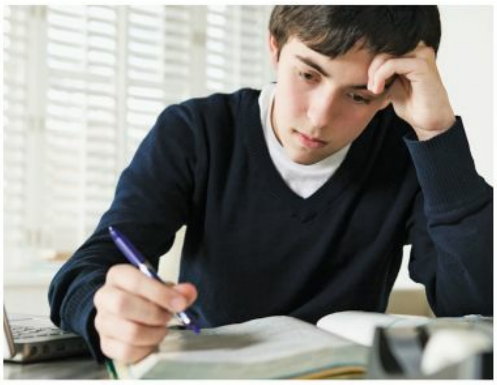
33-5 How can you use memory research findings to do better in this and other courses?

Biology's findings benefit medicine. Botany's findings benefit agriculture. So, too, can memory researchers' findings benefit education. Here, for easy reference, is a summary of some research-based suggestions that can help you remember information when you need it. The SQ3R—*S*urvey, *Q*uestion, *R*ead, *R*etrieve, *R*eview—study technique introduced in Module 2 incorporates several of these strategies.

Rehearse repeatedly. To master material, remember the *spacing effect* and use *distributed (spaced) practice.* To learn a concept, give yourself many separate study sessions. Take advantage of life's little intervals—riding a bus, walking to lunch, waiting for class to start. New memories are weak; exercise them and they will strengthen. To memorize specific facts or figures, research has shown that you should "rehearse the name or number you are trying to memorize, wait a few seconds, rehearse again, wait a little longer, rehearse again, then wait longer still and rehearse yet again. The waits should be as long as possible without losing the information" (Landauer, 2001). Reading complex material with minimal rehearsal yields little retention. Rehearsal and critical reflection help more. As the *testing effect* has shown, it pays to study actively. Taking class notes by hand, which requires summarizing material in your own words, leads to better retention than does verbatim laptop note taking. "The pen is mightier than the keyboard," note researchers Pam Mueller and Daniel Oppenheimer (2014).

Make the material meaningful. You can build a network of retrieval cues by taking notes in your own words, and then increase these cues by forming as many associations as possible. Apply the concepts to your own life. Form images. Understand and organize information. Relate the material to what you already know or have experienced. As William James

(1890) suggested, “Knit each new thing on to some acquisition already there.” Mindlessly repeating someone else’s words without taking the time to really understand what they mean won’t supply many retrieval cues. On a test, you may find yourself stuck when a question uses phrasing different from the words you memorized.


Rick Barrentine/Getty Images

Thinking and memory Actively thinking as we read, by rehearsing and relating ideas, and by making the material personally meaningful, yields the best retention.

Activate retrieval cues. Remember the importance of *context-dependent* and *state-dependent memory*. Mentally re-create the situation and the mood in which your original learning occurred. Jog your memory by allowing one thought to cue the next.

Use mnemonic devices. Make up a story that incorporates *vivid images* of the items. *Chunk* information into acronyms. Create rhythmic rhymes (such as “*i before e, except after c*”).

Minimize proactive and retroactive interference. Study before sleep. Do not schedule back-to-back study times for topics that are likely to interfere with each other, such as Spanish and French.

Sleep more. During sleep, the brain reorganizes and *consolidates* information for long-term memory. Sleep deprivation disrupts this process (Frenda et al., 2014; Lo et al., 2016). Even 10 minutes of waking rest enhances memory of what we have read (Dewar et al., 2012). So, after a period of hard study, you might just sit or lie down for a few minutes before tackling the next subject.

Test your own knowledge, both to rehearse it and to find out what you don’t yet know. The *testing effect* is real, and it is powerful. Don’t be lulled into overconfidence by your ability to *recognize* information. Test your *recall* using the Test Yourself items found throughout each unit, and the numbered Learning Targets at the end of each module. Outline sections using a blank page. Define the terms and concepts listed at each unit’s end before turning back to their definitions. Try the Multiple-Choice and Practice FRQ questions at the end of each module, and take the AP® Exam Practice Questions at the end of each unit. The online resources that accompany many texts, including LaunchPad for this text, are a good source for many other self-testing opportunities.

✓ Check Your Understanding

Ask Yourself

- Where do you think your own memory strategies need most improvement?

Test Yourself

- What memory strategies can help you study smarter and retain more information?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 33 REVIEW

33-1 Why do we forget?

- *Anterograde amnesia* is an inability to form new memories.
- *Retrograde amnesia* is an inability to retrieve old memories.
- Normal forgetting happens because we have never encoded information, because the physical trace has decayed, or because we cannot retrieve what we have encoded and stored.
- Retrieval problems may result from *proactive* (forward-acting) *interference*, as prior learning interferes with recall of new information, or from *retroactive* (backward-acting) *interference*, as new learning disrupts recall of old information.
- Some believe that motivated forgetting occurs, but researchers have found little evidence of *repression*.

33-2 How do misinformation, imagination, and source amnesia influence our memory construction? How do we decide whether a memory is real or false?

- Repeatedly “replaying” memories may alter them, leading to the introduction of inaccuracies (a process called *reconsolidation*).
- In experiments demonstrating the *misinformation effect*, people have formed false memories by incorporating misleading details—either after receiving wrong information after an event, or after repeatedly *imagining* and rehearsing something that never happened.
- When we reassemble a memory during retrieval, we may attribute it to the wrong source *(source amnesia)*. Source amnesia may help explain *déjà vu*.
- False memories feel like real memories and can be persistent but are usually limited to the main gist of the event.

33-3 Why have reports of repressed and recovered memories been so hotly debated?

- The debate (between memory researchers and some well-meaning therapists) focuses on whether memories of early childhood abuse are repressed and can be recovered during therapy.
- Professional organizations seek to find common ground between the potential for doubting true accusations of abuse and the potential for false accusations.
- Psychologists now agree that (1) sexual abuse happens; (2) injustice happens; (3) forgetting happens; (4) recovered memories are commonplace; (5) memories of things that happened before age 4 are unreliable; (6) memories “recovered” under hypnosis are especially unreliable; and (7) memories, whether real or false, can be emotionally upsetting.

33-4 How reliable are young children’s eyewitness descriptions?

- Children are susceptible to the misinformation effect, but if questioned in neutral words they understand, they can accurately recall events and people involved in them.

33-5 How can you use memory research findings to do better in this and other courses?

- Memory research findings suggest the following strategies for improving memory: Study repeatedly, make material meaningful, activate retrieval cues, use mnemonic devices, minimize interference, sleep more, and test yourself to be sure you can retrieve, as well as recognize, material.

Multiple-Choice Questions

1. Which of the following is an example of anterograde amnesia?

a. Halle can remember her new locker combination, but not her old one.
b. William has lost his memory of the 2 weeks before he had surgery to remove a benign brain tumor.
c. Louis can remember his past, but nothing since experiencing a brain infection 4 years ago.
d. Maddie can’t remember the details of when she was mugged downtown 6 months ago.
e. Kalund knows French, Latin, and Spanish and frequently gets them confused on exams.

2. Muhammad has been in his school cafeteria hundreds of times. It is a large room, and there are nine free-standing pillars that support the roof. One day, to illustrate the nature of forgetting, Muhammad’s teacher asks him how many pillars there are in the cafeteria. Muhammad has difficulty answering the question, but finally replies that he thinks there are six pillars. What memory concept does this example illustrate?

a. Storage decay
b. Retrograde amnesia
c. Proactive interference
d. Retroactive interference
e. Encoding failure

3. What does Hermann Ebbinghaus’ forgetting curve show about the nature of storage decay?

a. A slow, steady decrease as time goes on
b. A rapid initial decline followed by a leveling off
c. Rate of forgetting does not change as time goes on
d. A slow initial decline followed by a rapid loss after several years
e. Rate of forgetting varies according to the emotional state of the learner

4. Suzanne gets a new phone number. Each time she tries to give someone the new number, she gives her old one instead. The fact that her old number is causing difficulty in her remembering of the new one is an example of

- a. retroactive interference.
- b. retrograde amnesia.
- c. priming.
- d. proactive interference.
- e. anterograde amnesia

5. Regarding therapist-guided “recovered” memories of sexual abuse in infancy, which statement best represents an appropriate conclusion about this issue?

- a. Therapists who use hypnosis are likely to help their patients retrieve repressed memories.
- b. Statistics indicate that childhood sexual abuse rarely occurs; therefore, recovered memories of such abuse must be false.
- c. Memories are only rarely recovered; once you are unable to retrieve a memory you will probably never be able to retrieve it.
- d. One indicator of whether a recovered memory is true is the patient’s emotional response; only true recovered memories are emotionally upsetting.
- e. Since the brain is not sufficiently mature to store accurate memories of events before the age of 4, memories from the first 4 years of life are not reliable.

Practice FRQs

1. Tasnia feels like she encodes material well, but she still forgets the material on test day. Explain how her forgetting might be related to problems with each of the following:

- Storage
- Retrieval
- Retroactive interference

Answer

1 point: Storage: Tasnia may not remember the material if it decayed over time. Pages 352–353

1 point: Retrieval: Tasnia may have trouble getting the information out of her memory even though it may be on the tip of her tongue. To earn the point the student should demonstrate an understanding that the material has not been forgotten, simply that Tasnia is unable to remember it. Pages 353–354

1 point: Retroactive interference: Similar information learned after she studies will make it hard for Tasnia to remember the older information. Page 354

2. While waiting in the checkout line at the grocery store, you see the cashier next to you get robbed. The police interview you. Describe how the following would hinder your ability to give an accurate description of the robber:

- Misinformation effect
- Source amnesia
- Proactive interference

(3 points)

Module 34 Thinking, Concepts, and Creativity

LEARNING TARGETS

- **34-1 Define *cognition*, and describe the functions of concepts.**
- **34-2 Discuss the factors associated with *creativity*, and describe some ways of fostering creativity.**

In some ways, we humans are, as we will see, dim-witted. We fear the wrong things. We allow the day's local hot or cold weather to color our judgments of global climate change. We tend to be overconfident in our judgments and to persevere in clinging to discredited beliefs. Yet we also display remarkable mental powers. Our intelligence, creativity, and language mark us as "little less than the angels."

Concepts

Flip It Video: Concepts & Prototypes

34-1 What is *cognition*, and what are the functions of concepts?

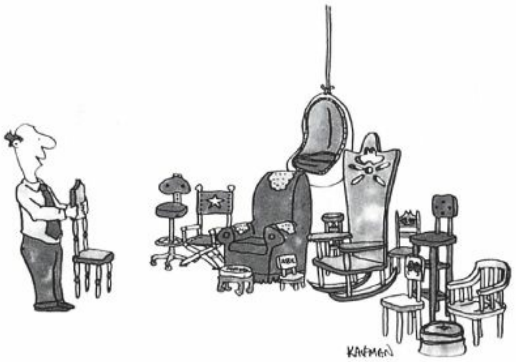
Psychologists who study **cognition** focus on the mental activities associated with thinking, knowing, remembering, and communicating information. One of these activities is forming **concepts**—mental groupings of similar objects, events, ideas, or people. The concept *chair* includes many items—a baby's high chair, a reclining chair, a dentist's chair—all for sitting. Concepts simplify our thinking. Imagine life without them. We could not ask a child to "throw the ball" because there would be no concept of *throw* or *ball*. Instead of saying, "They were angry," we would have to describe expressions, intensities, and words. Concepts such as *ball* and *anger* give us much information with little cognitive effort.

cognition

all the mental activities associated with thinking, knowing, remembering, and communicating.

concept

a mental grouping of similar objects, events, ideas, or people.



Jeff Kaufman The New Yorker Collection/The Cartoon Bank

"Attention, everyone! I'd like to introduce the newest member of our family."

We often form our concepts by developing **prototypes**—a mental image or best example of a category (Rosch, 1978). People more quickly agree that "a crow is a bird" than that "a penguin is a bird." For most of us, the crow is the birdier bird; it more closely resembles our *bird* prototype. Similarly, for people in modern multiethnic Germany, Caucasian Germans are more prototypically German (Kessler et al., 2010). When something closely matches our prototype of a concept—such as a bird or a German—we more readily recognize it as an example of the concept.

prototype

a mental image or best example of a category. Matching new items to a prototype provides a quick and easy method for sorting items into categories (as when comparing feathered creatures to a prototypical bird, such as a robin).

When we categorize people, we mentally shift them toward our category prototypes. Such was the experience of Belgian students who viewed ethnically blended faces. When viewing a blended face in which 70 percent of the features were Caucasian and 30 percent were Asian, the students categorized the face as Caucasian (**Figure 34.1**). Later, as their memory shifted toward the Caucasian prototype, they were more likely to remember an 80 percent Caucasian face than the 70 percent Caucasian face they had actually seen (Corneille et al., 2004). Likewise, if shown a 70 percent Asian face, they later remembered a more prototypically Asian face. So, too, with gender: People who viewed 70 percent male faces categorized them as male (no surprise there) and then later misremembered them as even more prototypically male (Huart et al., 2005).

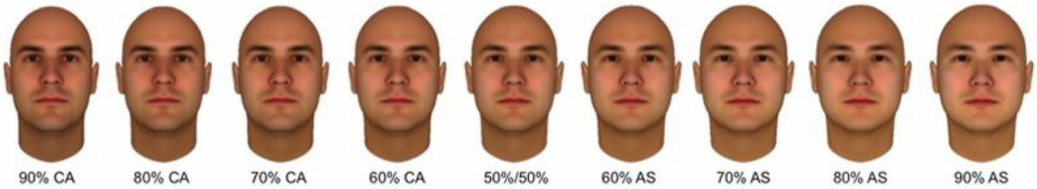


Figure 34.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
FaceGen TM

Figure 34.1 Categorizing faces influences recollection

Shown a face that was 70 percent Caucasian, people tended to classify the person as Caucasian and to recollect the face as more Caucasian than it was. (Recreation of experiment courtesy of Olivier Corneille.)

Move away from our prototypes, and category boundaries may blur. Is a tomato a fruit? Is a 16-year-old female a girl or a woman? Is a whale a fish or a mammal? Because a whale fails to match our *mammal* prototype, we are slower to recognize it as a mammal. Similarly, when symptoms don’t fit one of our disease prototypes, we are slow to perceive an illness (Bishop, 1991). People whose heart attack symptoms (shortness of breath, exhaustion, a dull weight in the chest) don’t match their *heart attack* prototype (sharp chest pain) may not seek help. And when behaviors don’t fit our *discrimination* prototypes—of White against Black, male against female, young against old—we often fail to notice prejudice. People more easily detect male prejudice against females than female against males or female against females (Cunningham et al., 2009; Inman & Baron, 1996). Although concepts speed and guide our thinking, they don’t always make us wise.

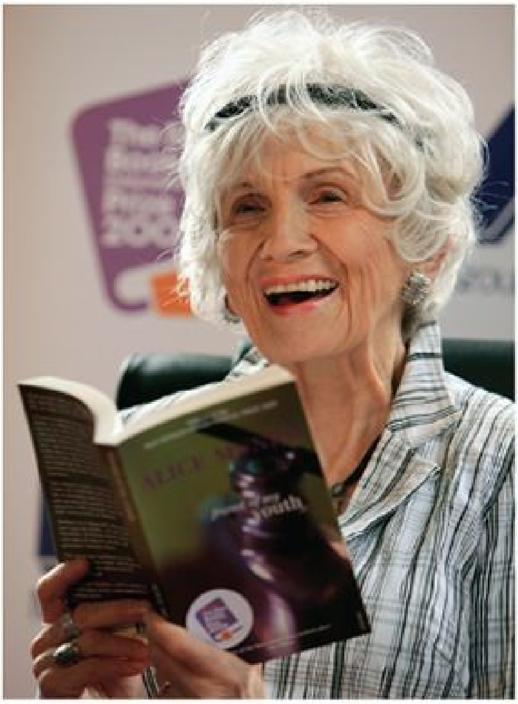
Thinking Creatively

34-2 What is *creativity*, and what fosters it?

Creativity is the ability to produce ideas that are both novel and valuable (Hennessey & Amabile, 2010). Consider Princeton mathematician Andrew Wiles' incredible, creative moment. Pierre de Fermat, a seventeenth-century mischievous genius, had challenged mathematicians of his day to match his solutions to various number theory problems. His most famous challenge—*Fermat's last theorem*—baffled the greatest mathematical minds, even after a $2 million prize (in today's dollars) was offered in 1908 to whoever first created a proof.

creativity

the ability to produce new and valuable ideas.



PETER MUHLY/Getty Images

Industrious creativity Researcher Sally Reis (2001) found that notably creative women were typically "intelligent, hard working, imaginative, and strong willed" as girls, noting examples such as Nobel Prize-winning geneticist Barbara McClintock. In her acceptance speech for the 2013 Nobel Prize for

Literature, author Alice Munro, shown here, also spoke about creativity as hard work. “Stories are so important in the world. . . . [The part that’s hardest is] when you go over the story and realize how bad it is. You know, the first part, excitement, the second, pretty good, but then you pick it up one morning and you think, ‘what nonsense,’ and that is when you really have to get to work on it. And for me, it always seemed the right thing to do.”

FYI

After picking up a Nobel Prize in Stockholm, physicist Richard Feynman stopped in Queens, New York, to look at his high school record. “My grades were not as good as I remembered,” he reported, “and my IQ was [a good, though unexceptional] 124” (Faber, 1987).

Wiles had pondered Fermat’s theorem for more than 30 years and had come to the brink of a solution. One morning in 1994, out of the blue, the final “incredible revelation” struck him. “It was so indescribably beautiful; it was so simple and so elegant. I couldn’t understand how I’d missed it. . . . It was the most important moment of my working life” (Singh, 1997, p. 25).

Creativity like Wiles’ is supported by a certain level of *aptitude* (ability to learn). Those who score exceptionally high in quantitative aptitude as 13-year-olds, for example, are later more likely to create published or patented work (Park et al., 2008; Robertson et al., 2010). Yet there is more to creativity than aptitude, or what intelligence tests reveal. Indeed, brain activity associated with intelligence differs from that associated with creativity (Jung & Haier, 2013). Aptitude tests (such as the SAT) typically require **convergent thinking**—an ability to provide a single correct answer.

convergent thinking

narrowing the available problem solutions to determine the single best solution.

Creativity tests *(How many uses can you think of for a brick?)* require

divergent thinking—the ability to consider many different options and to think in novel ways. Injury to certain areas of the frontal lobes can leave reading, writing, and arithmetic skills intact but destroy imagination (Kolb & Whishaw, 2006).

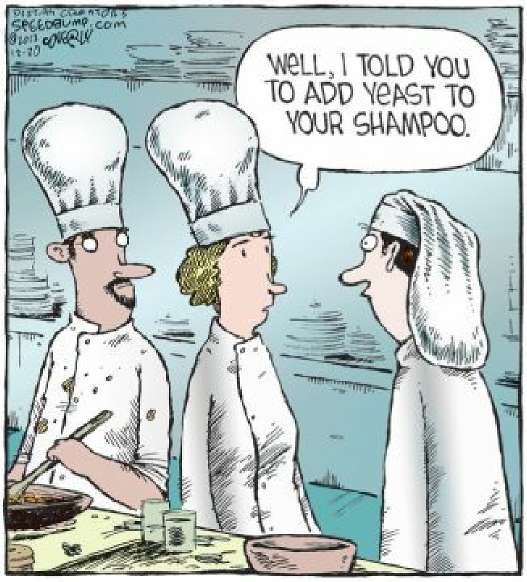
divergent thinking
expanding the number of possible problem solutions; creative thinking that diverges in different directions.

Robert Sternberg and his colleagues believe creativity has five components (Sternberg, 1988, 2003; Sternberg & Lubart, 1991, 1992):

1. ***Expertise***—well-developed knowledge—furnishes the ideas, images, and phrases we use as mental building blocks. "Chance favors only the prepared mind," observed Louis Pasteur. The more blocks we have, the more chances we have to combine them in novel ways. Wiles' well-developed knowledge put the needed theorems and methods at his disposal.
2. ***Imaginative thinking skills*** provide the ability to see things in novel ways, to recognize patterns, and to make connections. Having mastered a problem's basic elements, we can redefine or explore it in a new way. Copernicus first developed expertise regarding the solar system and its planets, and then creatively defined the system as revolving around the Sun, not the Earth. Wiles' imaginative solution combined two partial solutions.
3. ***A venturesome personality*** seeks new experiences, tolerates ambiguity and risk, and perseveres in overcoming obstacles. Wiles said he labored in near-isolation from the mathematics community partly to stay focused and avoid distraction. Such determination is an enduring trait.
4. ***Intrinsic motivation*** is the quality of being driven more by interest, satisfaction, and challenge than by external pressures (Amabile &

Hennessey, 1992). Creative people focus less on extrinsic motivators—meeting deadlines, impressing people, or making money—than on the pleasure and stimulation of the work itself. Asked how he solved such difficult scientific problems, Isaac Newton reportedly answered, “By thinking about them all the time.” Wiles concurred: “I was so obsessed by this problem that . . . I was thinking about it all the time—[from] when I woke up in the morning to when I went to sleep at night” (Singh & Riber, 1997).

5. ***A creative environment*** sparks, supports, and refines creative ideas. Wiles stood on the shoulders of others and collaborated with a former student. A study of the careers of 2026 prominent scientists and inventors revealed that the most eminent were mentored, challenged, and supported by their colleagues (Simonton, 1992). Creativity-fostering environments support innovation, team building, and communication (Hülsheger et al., 2009). They also minimize anxiety and foster contemplation (Byron & Khazanchi, 2011). While on a retreat in a monastery, Jonas Salk solved a problem that led to the polio vaccine. Later, when he designed the Salk Institute, he provided contemplative spaces where scientists could work without interruption (Sternberg, 2006).



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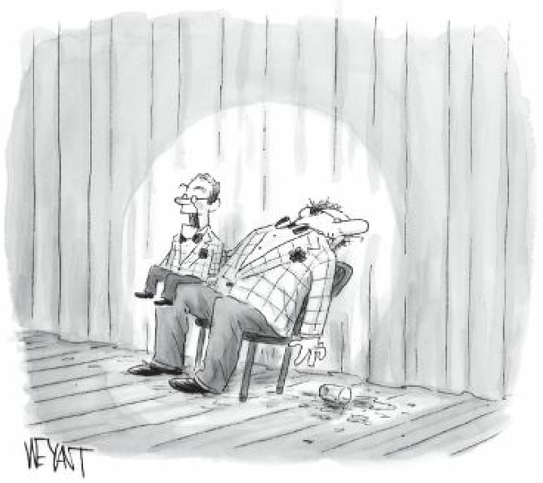
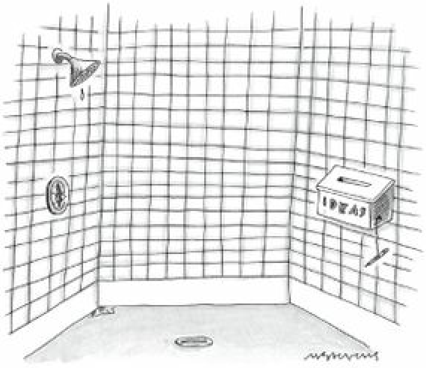


Christopher Weyant The New Yorker Collection/The Cartoon Bank

“For the love of God, is there a doctor in the house?”

Imaginative thinking Cartoonists often display creativity as they see things in new ways or make unusual connections.



Mick Stevens The New Yorker Collection /The Cartoon Bank

A creative environment

For those seeking to boost the creative process, research offers some ideas:

- *Develop your expertise.* Ask yourself what you care about and most enjoy. Follow your passion by broadening your knowledge base and becoming an expert at something.
- *Allow time for incubation.* Think hard on a problem, but then set it aside and come back to it later. For those with enough knowledge—the needed mental building blocks—a period of inattention to a problem (“sleeping on it”) allows for automatic processing to form associations (Zhong et al., 2008).
- *Set aside time for the mind to roam freely.* Creativity springs from “defocused attention” (Simonton, 2012a,b). So detach from attention-

grabbing television, social networking, and video gaming. Jog, go for a long walk, or meditate. Serenity seeds spontaneity.

- *Experience other cultures and ways of thinking.* Living abroad sets the creative juices flowing. Controlled studies show that students who have spent time abroad and embraced their host culture are more adept at working out creative solutions to problems (Lee et al., 2012; Tadmor et al., 2012). Even getting out of your neighborhood and exposing yourself to multicultural experiences fosters flexible thinking (Kim et al., 2013; Ritter et al., 2012).

✓ Check Your Understanding

Ask Yourself

- ▶ Imagine patiently waiting your turn at a store, and then having some later-arriving adults attended to before you. The clerk also wants to check inside your bag before you leave the store. What might all this say about the "teenager" prototype the clerk seems to have?

Test Yourself

- ▶ According to Robert Sternberg, what are the five components of creativity?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 34 REVIEW

34-1 What is cognition, and what are the functions of concepts?

- *Cognition* refers to all the mental activities associated with thinking, knowing, remembering, and communicating.
- We use *concepts*, mental groupings of similar objects, events, ideas, or people, to simplify and order the world around us.
- We form most concepts around *prototypes*, or best examples of a category.

34-2 What is creativity, and what fosters it?

- *Creativity*, the ability to produce novel and valuable ideas, is supported by a certain level of aptitude. But whereas aptitude tests require *convergent thinking* (the ability to provide one correct answer), creativity tests require *divergent thinking* (the ability to consider various options and think in novel ways).
- Sternberg has proposed that creativity has five components: expertise, imaginative thinking skills; a venturesome personality; intrinsic motivation; and a creative environment that sparks, supports, and refines creative ideas.

Multiple-Choice Questions

1. The mental activity associated with remembering, thinking, and knowing is called

a. cognition.
b. a concept.
c. a prototype.
d. convergent thinking.
e. divergent thinking.

2. Which of the following refers to the narrowing of available problem solutions with the goal of determining the best solution?

a. Allowing for incubation
b. Divergent thinking
c. Developing expertise
d. Convergent thinking
e. Experiencing other cultures

3. Producing valuable and novel ideas best defines which of the following?

a. Prototyping
b. Cognition
c. Intrinsic motivation
d. Venturesome personality
e. Creativity

4. When asked to think of a bird, many people think of a robin. In this case a robin is people's __________ for a bird.

a. prototype
b. concept
c. creative idea
d. convergent grouping
e. cognition

5. Your teachers asks how many uses you can think of for a pencil. She is testing your

a. convergent thinking.
b. intrinsic motivation.
c. divergent thinking.
d. prototypes.
e. concept.

Practice FRQs

1. Your family has had a golden retriever for years, and that represents your prototype of a dog. You just got a dachshund puppy for the holidays. Explain how your prototype of a dog will hinder, and how your concept of a dog will help, your thinking about the new puppy as a dog.

Answer

1 point: A prototype is a mental image or best example of a category. You may initially have a difficult time thinking of the new dog as a "dog," because it looks so much different from your dog prototype (golden retriever). Page 365

1 point: A concept is a mental grouping of similar objects, events, ideas, and people. Your new puppy will still act like a dog—wagging its tail and barking—so you will quickly recognize it as part of the "dog" concept. Page 365

2. A drug company is seeking to develop a new medication. Explain how the following elements of creativity could assist with the process:

- Expertise
- Divergent thinking
- Intrinsic motivation

(3 points)

Module 35 Solving Problems and Making Decisions

LEARNING TARGETS

- 35-1 Describe the cognitive strategies that assist our problem solving and the obstacles that hinder it.
- 35-2 Discuss the meaning of *intuition*, and describe how the availability and representativeness heuristics influence our decisions and judgments.
- 35-3 Discuss the factors that exaggerate our fear of unlikely events.
- 35-4 Describe how our decisions and judgments are affected by overconfidence, belief perseverance, and framing.
- 35-5 Discuss how smart thinkers use intuition.

Problem Solving: Strategies and Obstacles

35-1 What cognitive strategies assist our problem solving, and what obstacles hinder it?

Flip It Video: Heuristics & Algorithms

One tribute to our rationality is our problem-solving skill. What's the best route around this traffic jam? How should we handle a friend's criticism? How can we get in the house without our keys?

Some problems we solve through *trial and error*. Thomas Edison tried thousands of light bulb filaments before stumbling upon one that worked. For other problems, we use **algorithms**, step-by-step procedures that guarantee a solution. But step-by-step algorithms can be laborious and exasperating. To find a word using the 10 letters in *SPLOYOCHYG*, for example, you could try each letter in each of the 10 positions—907,200 permutations in all. Rather than give you a computing brain the size of a beach ball, nature resorts to **heuristics**, thinking short-cuts. Thus, you might reduce the number of options in the *SPLOYOCHYG* example by grouping letters that often appear together (*CH* and *GY*) and excluding rare letter combinations (such as *YY*). By using heuristics and then applying trial and error, you may hit on the answer. Have you guessed it?[1]

algorithm

a methodical, logical rule or procedure that guarantees solving a particular problem. Contrasts with the usually speedier—but also more error-prone—use of *heuristics*.

heuristic

a simple thinking strategy that often allows us to make judgments and solve problems efficiently; usually speedier but also more error-prone than an *algorithm*.

Monkey Business Images/Shutterstock

Heuristic searching To find guava juice, you could search every supermarket aisle (an algorithm), or check the bottled beverage, natural foods, and produce sections (heuristics). The heuristics approach is often speedier, but an algorithmic search guarantees you will find it eventually.

Sometimes, no problem-solving strategy seems to be at work at all, and we arrive at a solution to a problem with **insight**. Brain scans (EEGs or fMRIs) show bursts of activity associated with sudden flashes of insight (Kounios & Beeman, 2014). In one study, researchers asked people to think of a word that forms a compound word or phrase with each of three other words in a set (such as *pine*, *crab*, and *sauce*) and to press a button to sound a bell when they knew the answer. (Need a hint? The word is a fruit.[2]) A sudden Aha! insight led to about half the solutions. Before the Aha! moment, the problem solvers' frontal lobes (involved in focusing attention) were active. At the instant of discovery, there was a burst of activity in the right temporal lobe, just above the ear (**Figure 35.1**).

insight

a sudden realization of a problem's solution; contrasts with strategy-based solutions.

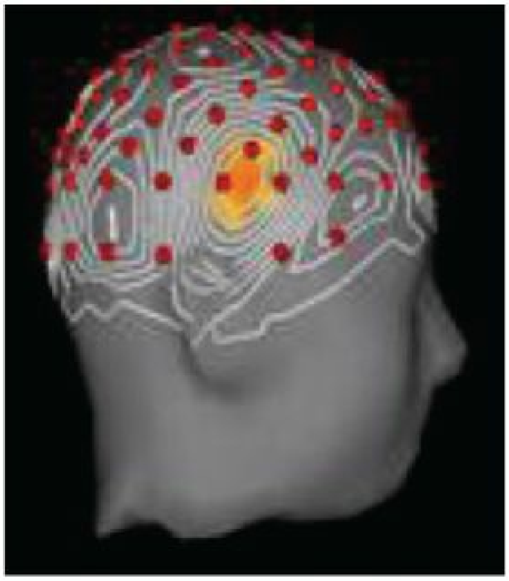


Figure 35.1
From Mark Jung-Beeman, Northwestern University, and John Kounios, Drexel University

Figure 35.1 The Aha! moment

A burst of right temporal lobe activity accompanied insight solutions to word problems (Jung-Beeman et al., 2004). The red dots designate EEG electrodes. The light gray lines show the distribution of high-frequency activity accompanying insight. The insight-related activity is centered in the right temporal lobe (yellow area).

Psychologist Wolfgang Köhler (1925) showed that humans are not the only creatures to display insight. He placed a piece of fruit and a long stick outside the cage of a chimpanzee named Sultan, beyond his reach. Inside the cage, Köhler placed a short stick, which Sultan grabbed, using it to try to reach the fruit. After several failed attempts, the chimpanzee dropped the stick and seemed to survey the situation. Then suddenly (as if thinking "Aha!"), Sultan jumped up and seized the short stick again. This time, he used it to pull in the longer stick—which he then used to reach the fruit. Apes have even exhibited foresight by storing a tool they could use to retrieve food the next day (Mulcahy & Call, 2006). (For one example of a chimpanzee's use of foresight, see Figure 83.1a.) And apes have displayed an ability to read others' minds—by anticipating where a human will look for an object, even if it's no longer there (Krupenye et al., 2016).

Birds, too, have displayed insight. One experiment, by (yes) Christopher Bird and Nathan Emery (2009), brought to life an Aesop fable in which a thirsty crow is unable to reach the water in a partly filled pitcher. See the crow's solution (exactly as in the fable) in Figure 83.1b. Other crows have fashioned wire or sticks for extracting food, such as insects in rotting logs (Rutz et al., 2016).

Insight strikes suddenly, with no prior sense of "getting warmer" or feeling close to a solution (Knoblich & Oellinger, 2006; Metcalfe, 1986). When the answer pops into mind *(apple!)*, we feel a happy sense of satisfaction. The joy of a joke may similarly lie in our sudden comprehension of an unexpected ending or a double meaning: "You don't need a parachute to skydive. You only need a parachute to skydive twice." Comedian Groucho Marx was a master at this: "I once shot an elephant in my pajamas. How he got in my pajamas I'll never know."

Insightful as we are, other cognitive tendencies may lead us astray. **Confirmation bias**, for example, leads us to seek evidence *for* our ideas more eagerly than we seek evidence *against* them (Klayman & Ha, 1987; Skov & Sherman, 1986). In a now-classic study, Peter Wason (1960) gave British university students a set of three numbers *(2-4-6)* and told them the series was based on a rule. Their task was to guess the rule. (It was simple: any three ascending numbers.) Before submitting answers, students generated their own three-number sets, and Wason told them whether their sets conformed to his rule. Once *certain* they had the rule, they could announce it. The result? Most students formed a wrong idea ("*Maybe it's counting by twos*") and then searched only for confirming evidence (by testing *6-8-10*, *100-102-104*, and so forth). Seldom right but never in doubt.

confirmation bias

a tendency to search for information that supports our preconceptions and to ignore or distort contradictory evidence.

"Ordinary people," said Wason (1981), "evade facts, become inconsistent, or systematically defend themselves against the threat of new information relevant to the issue." Thus, having formed a belief—that vaccines cause (or do not cause) autism spectrum disorder, that people can (or cannot) change their sexual orientation, that gun control does (or does not) save lives—we prefer information that supports our belief. And once we get hung up on an incorrect view of a problem, it's hard to approach it from a different angle. This obstacle to problem solving is called **fixation**, an inability to come to a fresh perspective. See if fixation prevents you from solving the matchstick problem in **Figure 35.2**. (For the solution, see **Figure 35.3**.)

fixation

in cognition, the inability to see a problem from a new perspective; an obstacle to problem solving.

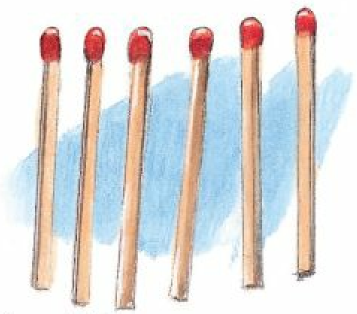


Figure 35.2
From "Problem Solving" by M. Scheerer.
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Figure 35.2 The matchstick problem

How would you arrange six matches to form four equilateral triangles?

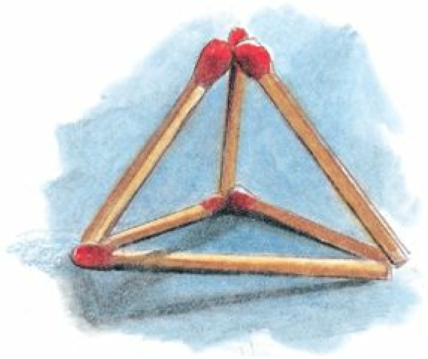

Figure 35.3
From "Problem Solving" by M. Scheerer.
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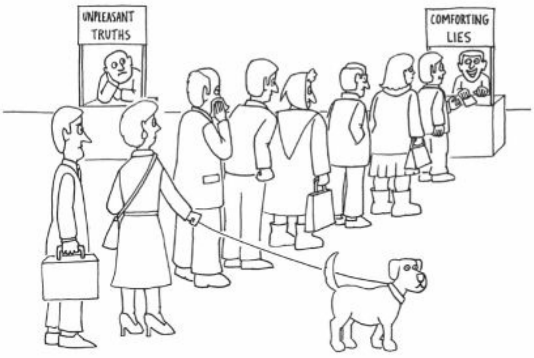
Figure 35.3 Solution to the matchstick problem

To solve this problem, you must view it from a new perspective, breaking the fixation of limiting solutions to two dimensions.

A prime example of fixation is **mental set**, our tendency to approach a problem with the mind-set of what has worked for us previously. Indeed, solutions that worked in the past often do work on new problems. Consider: Given the sequence *O-T-T-F-?-?-?*, what are the final three letters?

mental set

a tendency to approach a problem in one particular way, often a way that has been successful in the past.



S.H. Chambers

Most people have difficulty recognizing that the three final letters are

F(ive), *S*(ix), and *S*(even). But solving this problem may make the next one easier:

Given the sequence *J-F-M-A-?-?-?*, what are the final three letters? (If you don’t get this one, ask yourself what month it is.)

As a *perceptual set* predisposes what we perceive, a mental set predisposes how we think. Sometimes this can be an obstacle to problem solving, as when our mental set from our past experiences with matchsticks predisposes us to arrange them in two dimensions.

Forming Good (and Bad) Decisions and Judgments

35-2 What is *intuition*, and how can the availability and representativeness heuristics influence our decisions and judgments?

When making each day's hundreds of judgments and decisions *(Should I take a jacket? Can I trust this person? Should I shoot the basketball or pass to the player who's hot?)*, we seldom take the time and effort to reason systematically. We follow our **intuition**, our fast, automatic, unreasoned feelings and thoughts. After interviewing policy makers in government, business, and education, social psychologist Irving Janis (1986) concluded that they "often do not use a reflective problem-solving approach. How do they usually arrive at their decisions? If you ask, they are likely to tell you . . . they do it mostly by the *seat of their pants*."

intuition

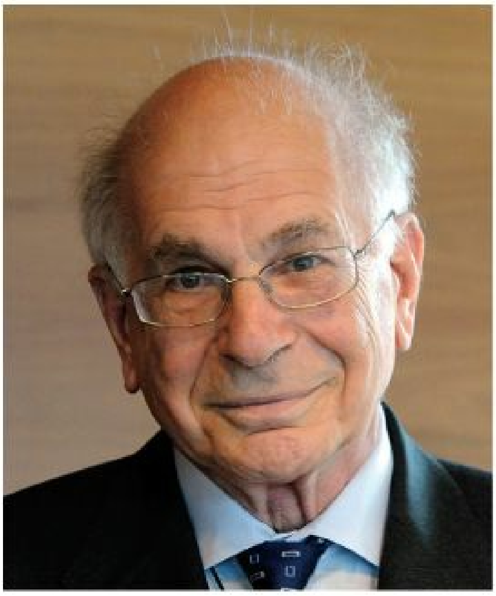
an effortless, immediate, automatic feeling or thought, as contrasted with explicit, conscious reasoning.

Two Quick but Risky Shortcuts

When we need to make snap judgments, heuristics enable quick thinking without conscious awareness, and they usually serve us well (Gigerenzer, 2015). But as research by cognitive psychologists Amos Tversky and Daniel Kahneman (1974) on the *representativeness* and *availability heuristics* has shown, these intuitive mental shortcuts can lead even the smartest people into dumb decisions.

Amos Tversky (1985)

“In creating these problems, we didn’t set out to fool people. All our problems fooled us, too.”



Carsten Rehder/KIEL/European Pressphoto Agency/Newscom

“Intuitive thinking [is] fine most of the time. . . . But sometimes that habit of mind gets us in trouble.” Daniel Kahneman (2005)

The Representativeness Heuristic

To judge the likelihood of something by intuitively comparing it to particular prototypes is to use the **representativeness heuristic**. Imagine someone who is short, slim, and likes to read poetry. Is this person more likely to be an Ivy League university English professor or a truck driver

(Nisbett & Ross, 1980)?

representativeness heuristic
estimating the likelihood of events in terms of how well they seem to represent, or match, particular prototypes; may lead us to ignore other relevant information.

Many people guess English professor—because the person better fits their prototype of nerdy professor than of truck driver. In doing so, they fail to consider the *base rate* number of Ivy League English professors (fewer than 400) and truck drivers (3.5 million in the United States alone). Thus, even if the description is 50 times more typical of English professors than of truck drivers, the fact that there are about 7000 times more truck drivers means that the poetry reader is many times more likely to be a truck driver.

Bradford Veley/CartoonStock

"The problem is I can't tell the difference between a deeply wise, intuitive nudge from the Universe and one of my own bone-headed ideas!"

Some prototypes have social consequences. Consider the reaction of some non-Arab travelers soon after 9/11, when a young male of Arab descent boarded their plane. The young man fit (represented) their “terrorist” prototype, and the representativeness heuristic kicked in. His presence evoked anxiety among his fellow passengers—even though nearly 100 percent of those who fit this prototype are peace-loving citizens. One mother of two Black and three White teens asks other parents, “Do store personnel follow your children when they are picking out their Gatorade flavors? They didn’t follow my White kids. . . . When your kids trick-or-treat dressed as a ninja and a clown, do they get asked who they are with and where they live, door after door? My White kids didn’t get asked. Do your kids get pulled out of the TSA line time and again for additional screening? My White kids didn’t” (Roper, 2016). If people have a prototype—a stereotype—of delinquent Black teens, they may unconsciously use the representativeness heuristic when judging individuals. The result, even if unintended, is racism.

FYI

Tversky and Kahneman’s joint work on decision making received a 2002 Nobel Prize; sadly, only Kahneman was alive to receive the honor.

> “*Kahneman and his colleagues and students have changed the way we think about the way people think.*”
>
> *American Psychological Association President Sharon Brehm, 2007*

The Availability Heuristic

The **availability heuristic** operates when we estimate how common an event is *based on its mental availability.* Anything that makes information pop into mind—its vividness, recency, or distinctiveness—can make it seem commonplace. Casinos know this. They entice us to gamble by broadcasting wins with noisy bells and flashing lights. The big losses are soundlessly invisible.

availability heuristic

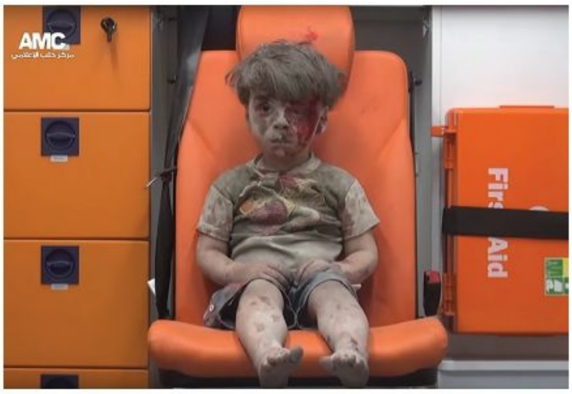
estimating the likelihood of events based on their availability in memory; if instances come readily to mind (perhaps because of their vividness), we presume such events are common.

The availability heuristic can also distort our judgments of other people. If people from a particular ethnic or religious group commit a terrorist act, as seen in pictures of innocent people about to be beheaded, our readily available memory of the dramatic event may shape our impression of the whole group. Terrorists aim to evoke excessive terror. If terrorists were to kill 1000 people in the United States this year, Americans would be mighty afraid. Yet they would have reason to be 30 times more afraid of homicidal, suicidal, and accidental death by guns, which take more than 30,000 lives annually. In 2015 and again in 2016, feared Islamic terrorists shot and killed fewer Americans than did armed toddlers (Ingraham, 2016; LaCapria, 2015). The bottom line: *We often fear the wrong things.* (See Thinking Critically About: The Fear Factor).

AP® EXAM TIP

Make sure you understand the difference between representativeness and availability heuristics. AP® exam takers have confused them.

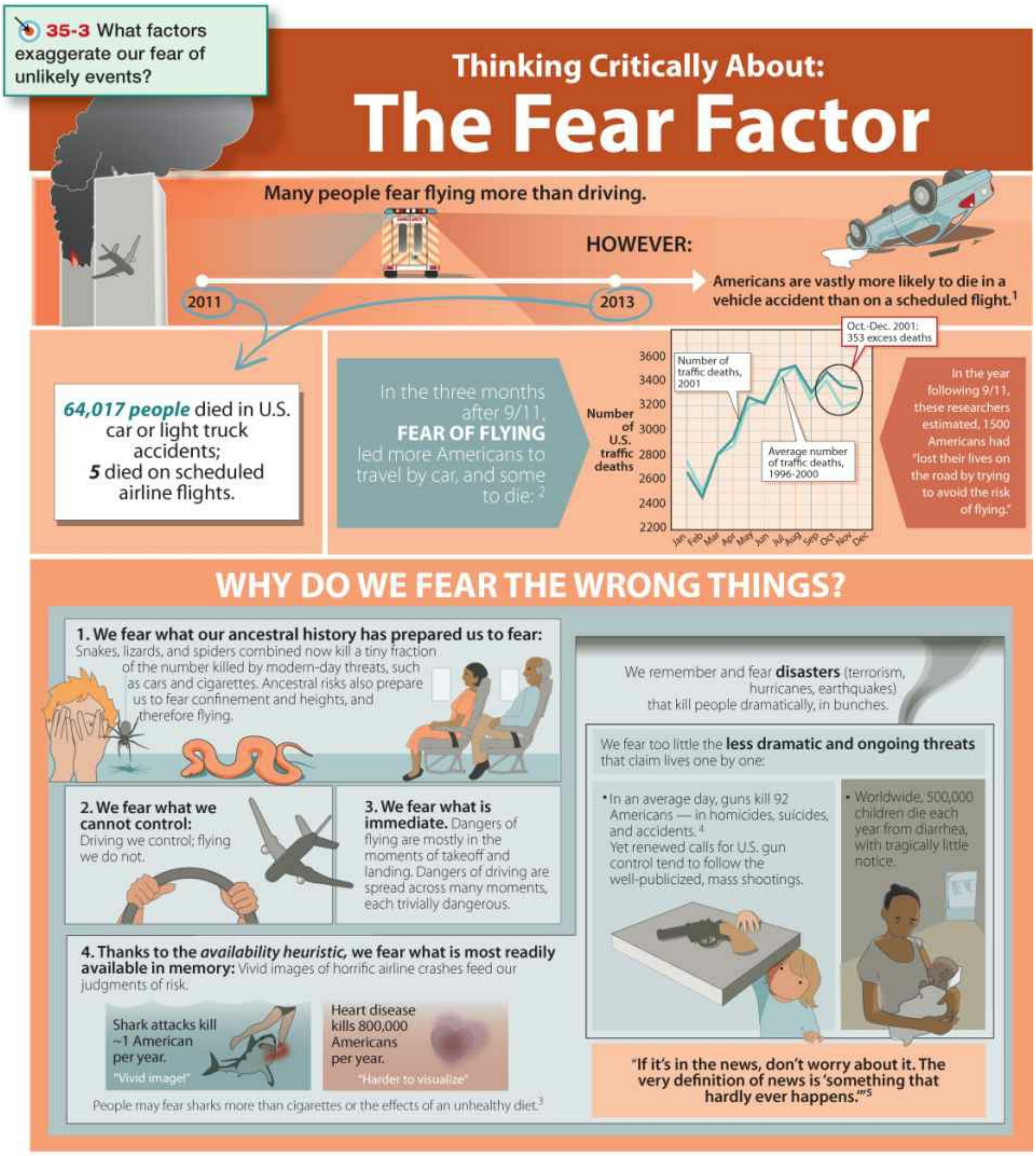
Meanwhile, the lack of available images of future climate change disasters—which some scientists regard as “Armageddon in slow motion”—has left many people unconcerned (Pew, 2014). What’s more cognitively available than slow climate change is our recently experienced local weather, which tells us nothing about long-term planetary trends (Egan & Mullin, 2012; Kaufmann et al., 2017; Zaval et al., 2014). Unusually hot local weather increases people’s worry about global climate warming, while a recent cold day reduces their concern and overwhelms less memorable scientific data (Li et al., 2011). After Hurricane Sandy devastated New Jersey, its residents' vivid experience of extreme weather increased their environmentalism (Rudman et al., 2013).



ALEPPO MEDIA CENTER/picture-alliance/dpa/AP Images

The power of a vivid example The unforgettable (cognitively available) photo of 5-year-old Omran Daqneesh—dazed after being pulled from the rubble of yet another air strike in Aleppo, Syria—did more than an armload of statistics to awaken Western nations to the plight of Syrian migrants fleeing violence.

35-3 What factors exaggerate our fear of unlikely events?



Thinking Critically About:

The Fear Factor

Many people fear flying more than driving.

HOWEVER:

Americans are vastly more likely to die in a vehicle accident than on a scheduled flight.[1]

64,017 people died in U.S. car or light truck accidents; *5* died on scheduled airline flights.

In the three months after 9/11, **FEAR OF FLYING** led more Americans to travel by car, and some to die:[2]

In the year following 9/11, these researchers estimated, 1500 Americans had "lost their lives on the road by trying to avoid the risk of flying."

WHY DO WE FEAR THE WRONG THINGS?

1. We fear what our ancestral history has prepared us to fear: Snakes, lizards, and spiders combined now kill a tiny fraction of the number killed by modern-day threats, such as cars and cigarettes. Ancestral risks also prepare us to fear confinement and heights, and therefore flying.

2. We fear what we cannot control: Driving we control; flying we do not.

3. We fear what is immediate. Dangers of flying are mostly in the moments of takeoff and landing. Dangers of driving are spread across many moments, each trivially dangerous.

4. Thanks to the *availability heuristic*, we fear what is most readily available in memory: Vivid images of horrific airline crashes feed our judgments of risk.

Shark attacks kill ~1 American per year. "Vivid image!"

Heart disease kills 800,000 Americans per year. "Harder to visualize"

People may fear sharks more than cigarettes or the effects of an unhealthy diet.[3]

We remember and fear **disasters** (terrorism, hurricanes, earthquakes) that kill people dramatically, in bunches.

We fear too little the **less dramatic and ongoing threats** that claim lives one by one:

- In an average day, guns kill 92 Americans — in homicides, suicides, and accidents.[4] Yet renewed calls for U.S. gun control tend to follow the well-publicized, mass shootings.
- Worldwide, 500,000 children die each year from diarrhea, with tragically little notice.

"If it's in the news, don't worry about it. The very definition of news is 'something that hardly ever happens.'"[5]

2011
2013
Number of U.S. traffic deaths
3600
3400
3200
3000
2800
2600
2400
2200
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Number of traffic deaths, 2001
Average number of traffic deaths, 1996-2000
Oct.-Dec. 2001: 353 excess deaths

1. National Safety Council, 2016. 2. Gigerenzer, 2004, 2006; Gaissmaier & Gigerenzer, 2012. 3. Daley, 2011. 4. Xu et al., 2016. 5. Schneier, 2007.

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Over 40 nations have sought to harness the positive power of vivid, memorable images by putting eye-catching warnings and graphic photos on cigarette packages (Riordan, 2013). This campaign has worked because we reason emotionally (Huang et al., 2013). We overfeel and underthink (Slovic, 2007). In one study, Red Cross donations to Syrian refugees were 55 times greater in response to the publication of an iconic photo of a child killed compared with statistics describing the hundreds of thousands of other refugee deaths (Slovic et al., 2017). Dramatic outcomes make us gasp; probabilities we hardly grasp.

> “*Don't believe everything you think.*”

Bumper sticker

Overconfidence

35-4 How are our decisions and judgments affected by overconfidence, belief perseverance, and framing?

Sometimes our decisions and judgments go awry simply because we are more confident than correct. Across various tasks, people overestimate their performance (Metcalfe, 1998). If 60 percent of people correctly answer a factual question, such as “Is absinthe a liqueur or a precious stone?” they will typically average 75 percent confidence (Fischhoff et al., 1977). (It’s a licorice-flavored liqueur.) This tendency to overestimate the accuracy of our knowledge and judgments is **overconfidence**. Those who are wrong are especially vulnerable to overconfidence. One experiment gave students various physics and logic problems. Students who falsely thought a ball would continue following a curved path when rolling out of a curved tube were virtually as confident as those who correctly discerned that the ball, like water from a curled hose, would follow a straight path (Williams et al., 2013).

overconfidence

the tendency to be more confident than correct—to overestimate the accuracy of our beliefs and judgments.

It is overconfidence that drives stockbrokers and investment managers to market their ability to outperform stock market averages—which, as a group, they cannot (Malkiel, 2016). A purchase of stock *X*, recommended by a broker who judges this to be the time to buy, is usually balanced by a sale made by someone who judges this to be the time to sell. Despite their confidence, buyer and seller cannot both be right. And it is overconfidence that so often leads us to succumb to a *planning fallacy*—overestimating our future leisure time and income (Zauberman & Lynch, 2005). Students and others often expect to finish assignments ahead of schedule (Buehler et al., 1994, 2002). In fact, such projects generally take about twice the predicted time. Anticipating how much more time we will have next month, we happily accept invitations. And believing we'll surely have more money next year, we take out loans or buy on credit. Despite our past overconfident predictions, we remain overly confident of our next prediction.

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Predict your own behavior When will you finish reading this module?

Overconfidence—the bias that Kahneman (2015), if given a magic wand, would most like to eliminate—can feed extreme political views. History is full of leaders who, when waging war, were more confident than correct. One research team tested 743 analysts' ability to predict future events—predictions that typically are overconfident. Those whose predictions most often failed tended to be inflexible and closed-minded (Mellers et al., 2015). Ordinary citizens with only a shallow understanding of complex proposals, such as for cap-and-trade carbon emissions or a flat tax, may also express strong views. (Sometimes the less we know, the more definite we sound.) Asking such people to explain the details of these policies exposes them to their own ignorance, which in turn leads them to express more moderate views (Fernbach et al., 2013). To confront one's own ignorance is to become wiser.

Nevertheless, overconfidence sometimes has adaptive value. Believing that their decisions are right and they have time to spare, self-confident people tend to live more happily. They make tough decisions more easily, and they seem competent (Anderson, C. A., et al., 2012). Given prompt and clear feedback, we can also learn to be more realistic about the accuracy of our judgments (Fischhoff, 1982). That's true of weather forecasters: Extensive feedback has enabled them to estimate their forecast accuracy ("a 60 percent chance of rain"). The wisdom to know when we know a thing and when we do not is born of experience.

> “*When you know a thing, to hold that you know it; and when you do not know a thing, to allow that you do not know it; this is knowledge.*”
>
> *Confucius (551–479 B.C.E.),* Analects

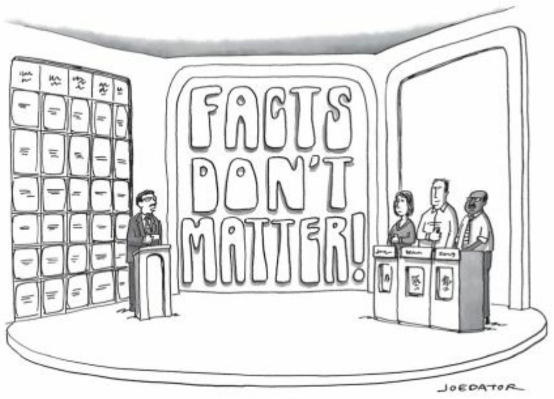
Belief Perseverance

Our overconfidence is startling. Equally so is our **belief perseverance**—our tendency to cling to our beliefs in the face of contrary evidence. A classic study of belief perseverance engaged people with opposing views of capital punishment (Lord et al., 1979). After studying two supposedly new research findings, one supporting and the other refuting the claim that the death penalty deters crime, each side was more impressed by the study supporting its own beliefs. And each readily disputed the other study. Thus, showing the pro- and anti-capital-punishment groups the *same* mixed evidence actually *increased* their disagreement. Rather than using evidence to draw conclusions, they used their conclusions to assess evidence—a phenomenon also known as *motivated reasoning.*

belief perseverance

clinging to one's initial conceptions after the basis on which they were formed has been discredited.

In other studies and in everyday life, people have similarly welcomed belief-supportive evidence—about climate change, same-sex marriage, or politics—while discounting challenging evidence (Friesen et al., 2015; Sunstein et al., 2016). In the late 1980s, most Democrats believed that inflation had risen under Republican President Reagan (it had dropped). In 2016, two-thirds of Republicans surveyed said that unemployment had increased under President Obama (unemployment had plummeted). In each case, politics overrode facts (Public Policy Polling, 2016). Big time. As an old Chinese proverb says, “Two-thirds of what we see is behind our eyes.”



Joe Dator The New Yorker Collection/The Cartoon Bank

“I’m sorry, Jeannie, your answer was correct, but Kevin shouted his incorrect answer over yours, so he gets the points.“

To rein in belief perseverance, a simple remedy exists: *Consider the opposite.* When the same researchers repeated the capital-punishment study, they asked some participants to be “as *objective* and *unbiased* as possible” (Lord et al., 1984). The plea did nothing to reduce biased evaluations of evidence. They also asked another group to consider “whether you would have made the same high or low evaluations had exactly the same study produced results on the *other* side of the issue.” Having imagined and pondered *opposite* findings, these people became much less biased.

The more we come to appreciate why our beliefs might be true, the more tightly we cling to them. Once we have explained to ourselves why candidate X or Y will be a better commander-in-chief, we tend to ignore evidence undermining our belief. As we will see in Unit XIV, once beliefs form and get justified, it takes more compelling evidence to change them than it did to create them. Prejudice persists. Beliefs often persevere.

AP® EXAM TIP

We're all human—and vulnerable to confirmation bias, overconfidence, and belief perseverance. Can you distinguish these?

The Effects of Framing

Framing—the way we present an issue—can be a powerful tool of persuasion. Governments know this. People are more supportive of "gun safety" than "gun control" laws, more welcoming of "undocumented workers" than of "illegal aliens," more agreeable to a "carbon offset fee" than to a "carbon tax," and more accepting of "enhanced interrogation" than of "torture." And consider how the framing of options can nudge people toward beneficial decisions (Bohannon, 2016; Fox & Tannenbaum, 2015; Thaler & Sunstein, 2008):

framing

the way an issue is posed; how an issue is worded can significantly affect decisions and judgments.

- *Choosing to live or die.* Imagine two surgeons explaining the risk of an upcoming surgery. One explains that during this type of surgery, 10 percent of people die. The other explains that 90 percent survive. The information is the same. The effect is not. In real-life surveys, patients and physicians overwhelmingly say the risk is greater when they hear that 10 percent *die* (Marteau, 1989; McNeil et al., 1988; Rothman & Salovey, 1997).
- *Becoming an organ donor.* In many European countries, as well as in

the United States, people renewing their driver's license can decide whether to be organ donors. In some countries, the default option is *Yes*, but people can opt out. Nearly 100 percent of the people in opt-out countries have agreed to be donors. In countries where the default option is *No*, most do *not* agree to be donors (Hajhosseini et al., 2013; Johnson & Goldstein, 2003).

- *Opting to save for retirement.* U.S. companies once required employees who wanted to contribute to a retirement plan to choose a lower take-home pay, which few people did. Thanks to a new law, they can now automatically enroll their employees in the plan but allow them to opt out. Either way, the decision to contribute is the employee's. But under the new "opt-out" arrangement, enrollments in one analysis of 3.4 million workers soared from 59 to 86 percent (Rosenberg, 2010). Britain's 2012 change to an opt-out framing similarly led to 5 million more retirement savers (Halpern, 2015).

The point to remember: Framing can nudge our attitudes and decisions.

The Perils and Powers of Intuition

35-5 How do smart thinkers use intuition?

We have seen how our unreasoned intuition can plague our efforts to solve problems, assess risks, and make wise decisions. The perils of intuition can persist even when people are offered extra pay for thinking smart, even when they are asked to justify their answers, and even among expert physicians, clinicians, and U.S. federal intelligence agents (Reyna et al., 2014; Shafir & LeBoeuf, 2002; Stanovich et al., 2013). Very smart people can make not-so-smart judgments.

So, are our heads indeed filled with straw? Good news: Cognitive scientists are also revealing intuition's powers. For example:

- *Intuition is recognition born of experience*. It is implicit (unconscious) knowledge—what we've recorded in our brains but can't fully explain (Chassy & Gobet, 2011; Gore & Sadler-Smith, 2011). We see this ability to size up a situation and react in an eyeblink in chess masters playing speed chess, as they intuitively know the right move (Burns, 2004). We see it in the smart and quick judgments of experienced nurses, firefighters, art critics, and car mechanics. We see it in skilled athletes who react *without thinking*. Indeed, conscious thinking may disrupt well-practiced movements, leading skilled athletes to choke under pressure, as when shooting free throws (Beilock, 2010). And we would see this instant intuition in you, too, for anything in which you have developed knowledge based on experience.

- *Intuition is usually adaptive, enabling quick reactions.* Our fast and frugal heuristics let us intuitively assume that fuzzy-looking objects are far away—which they usually are, except on foggy mornings. Our learned associations surface as gut feelings, right or wrong: Seeing a stranger who looks like someone who has harmed or threatened us in the past, we may automatically react with distrust. Newlyweds' implicit attitudes toward their new spouses likewise predict their future marital happiness (McNulty et al., 2013).
- *Intuition is huge.* Recall from Module 16 that through selective attention, we can focus our conscious awareness on a particular aspect of all we experience. Our mind's unconscious track, however, makes good use intuitively of what we are not consciously processing. Unconscious, automatic influences are constantly affecting our judgments (Custers & Aarts, 2010). Consider: Most people guess that the more complex the choice, the smarter it is to make decisions rationally rather than intuitively (Inbar et al., 2010). Actually, in making complex decisions, we sometimes benefit by letting our brain work on a problem without consciously thinking about it (Strick et al., 2010, 2011). In one series of experiments, three groups of people read complex information (for example, about apartments or European football matches). Those in the first group stated their preference immediately after reading information about four possible options. The second group, given several minutes to analyze the information, made slightly smarter decisions. But wisest of all, in several studies, were

those in the third group, whose attention was distracted for a time, enabling their minds to engage in automatic, unconscious processing of the complex information. The practical lesson: Letting a problem incubate while we attend to other things can pay dividends (Dijksterhuis & Strick, 2016). Facing a difficult decision involving a lot of facts, we’re wise to gather all the information we can, and then say, “Give me some time *not* to think about this, even to sleep on it.” Thanks to our ever-active brain, nonconscious thinking (reasoning, problem solving, decision making, planning) can be surprisingly astute (Creswell et al., 2013; Hassin, 2013; Lin & Murray, 2015).

Critics note that some studies have not found the supposed power of unconscious thought, and they remind us that deliberate, conscious thought also furthers smart thinking (Newell, 2015; Nieuwenstein et al., 2015; Phillips et al., 2016). In challenging situations, superior decision makers, including chess players, take time to think (Moxley et al., 2012). And with many sorts of problems, deliberative thinkers are aware of the intuitive option, but know when to override it (Mata et al., 2013). Consider two problems:

1. A bat and a ball together cost 110 cents. The bat costs 100 cents more than the ball. How much does the ball cost?
2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

> “ *The heart has its reasons which reason does not know.* ”
>
> *Blaise Pascal*, Pensees, *1670*

Most people’s intuitive responses—10 cents and 100 minutes—are wrong, and a few moments of deliberate thinking reveals why.[3]

TRY THIS

What time is it now? When we asked you (in the section on overconfidence) to estimate how quickly you would finish this module, did you underestimate or overestimate?

The bottom line: Our two-track mind makes sweet harmony as smart, critical thinking listens to the creative whispers of our vast unseen mind and then evaluates evidence, tests conclusions, and plans for the future.

For a summary of some key ideas from this section, see Table 35.1.

TABLE 35.1 Comparing Cognitive Processes and Strategies

Process or Strategy	Description	Powers	Perils
Algorithm	Methodical rule or procedure	Guarantees solution	Requires time and effort
Heuristic	Simple thinking shortcut, such as the availability heuristic (which estimates likelihood based on how easily events come to mind)	Lets us act quickly and efficiently	Puts us at risk for errors
Insight	Sudden Aha! reaction	Provides instant realization of solution	May not happen
Confirmation bias	Tendency to search for support for our own views and ignore contradictory evidence	Lets us quickly recognize supporting evidence	Hinders recognition of contradictory evidence
Fixation	Inability to view problems from a new angle	Focuses thinking on familiar solutions	Hinders creative problem solving
Intuition	Fast, automatic feelings and thoughts	Is based on our experience: huge and	Can lead us to overfeel and underthink

		adaptive	
Overconfidence	Overestimating the accuracy of our beliefs and judgments	Allows us to be happy and to make decisions easily	Puts us at risk for errors
Belief perseverance	Ignoring evidence that proves our beliefs are wrong	Supports our enduring beliefs	Closes our mind to new ideas
Framing	Wording a question or statement so that it evokes a desired response	Can influence others' decisions	Can produce a misleading result
Creativity	Ability to innovate valuable ideas	Produces new insights and products	May distract from structured, routine work

✓ Check Your Understanding

Ask Yourself

- People's perceptions of risk, often biased by vivid images from movies or the news, are surprisingly unrelated to actual risks. (People may hide in the basement during thunderstorms but fail to buckle their seat belts in the car.) What are the things you fear? Are some of those fears out of proportion to statistical risk? Are you failing, in other areas of your life, to take reasonable precautions?

Test Yourself

- Why is news so often focused on "something that hardly ever happens"? How does knowing this help us assess our fears?
- Match the process or strategy listed below (1–10) with its description (a–j).

1. Algorithm a. Inability to view problems

	from a new angle; focuses thinking but hinders creative problem solving.
2. Intuition	b. Methodological rule or procedure that guarantees a solution but requires time and effort.
3. Insight	c. Your fast, automatic, effortless feelings and thoughts based on your experience; huge and adaptive but can lead you to overfeel and underthink.
4. Heuristic	d. Simple thinking shortcut that enables quick and efficient decisions but puts us at risk for errors.
5. Fixation	e. Sudden Aha! reaction that instantly reveals the solution.
6. Confirmation bias	f. Tendency to search for support for your own views and to ignore contradictory evidence.
7. Overconfidence	g. Holding on to your beliefs even after they are proven wrong; closing your mind to new ideas.
8. Creativity	h. Overestimating the accuracy of your beliefs and judgments; allows you to be happier and to make decisions more easily, but puts you at risk for errors.
9. Framing	i. Wording a question or statement so that it evokes a desired response; can mislead people and influence their decisions.

10. Belief perseverance	j. The ability to produce novel and valuable ideas.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 35 REVIEW

35-1 What cognitive strategies assist our problem solving, and what obstacles hinder it?

- An *algorithm* is a methodical, logical rule or procedure (such as a step-by-step description for evacuating a building during a fire) that guarantees a solution to a problem.
- A *heuristic* is a simple thinking strategy that is usually speedier than an algorithm but is also more error-prone.
- *Insight* is not a strategy-based solution, but rather a sudden flash of inspiration that solves a problem.
- Obstacles to problem solving include *confirmation bias*, which predisposes us to verify rather than challenge our hypotheses, and *fixation*, such as *mental set*, which may prevent us from taking the fresh perspective that would lead to a solution.

35-2 What is intuition, and how can the availability and representativeness heuristics influence our decisions and judgments?

- *Intuition* is the effortless, immediate, automatic feeling or thoughts we often use instead of systematic reasoning.
- Heuristics enable snap judgments. *The representativeness heuristic* leads us to judge the likelihood of things in terms of how they represent our prototype for a group of items. Using the *availability heuristic*, we judge the likelihood of things based on how readily they come to mind, which often leads us to fear the wrong things.

35-3 What factors exaggerate our fear of unlikely events?

- We fear (1) what our ancestral history has prepared us to fear, even though these risks may no longer be significant; (2) what we cannot control; (3) what is immediate; and (4) what is most readily available in memory.

- We remember and fear disasters more than ongoing, less dramatic threats.

35-4 How are our decisions and judgments affected by overconfidence, belief perseverance, and framing?

- *Overconfidence* can lead us to overestimate the accuracy of our beliefs.
- When a belief we have formed and explained has been discredited, *belief perseverance* may cause us to cling to that belief. A remedy is to consider how we might have explained an opposite result.
- *Framing* is the way a question or statement is presented. Subtle differences in presentation can dramatically alter our responses.

35-5 How do smart thinkers use intuition?

- Smart thinkers welcome their intuitions (which are usually adaptive), but also know when to override them.
- When making complex decisions, we may benefit from gathering as much information as possible and then taking time to let our two-track mind process it.
- As people gain expertise, they grow adept at making quick, shrewd judgments.

Multiple-Choice Questions

1. A methodical, logical rule that guarantees solving a particular problem is called a(n)

a. heuristic.
b. algorithm.
c. insight.

d. mental set.
e. confirmation bias.

2. Thom believes that his congresswoman is an honest woman. He looks for examples of her giving to charity and ignores her ethics violations, which have recently been in the news. Thom is being affected by

a. confirmation bias.
b. intuition.
c. mental set.
d. the availability heuristic.
e. overconfidence.

3. Thom still believes that the congresswoman is an honest person even after she is arrested and sent to jail. Thom is now experiencing

a. framing.
b. intuition.
c. insight.
d. belief perseverance.
e. confirmation bias.

4. Many people prefer meat that is 80 percent lean instead of 20 percent fat, even though they are the same thing. Which concept is being used when the same information is presented in a more desirable way?

a. Intuition
b. Insight
c. Framing
d. Overconfidence
e. Perseverance

5. After seeing a news story about a kidnapping, we are more afraid of kidnapping, even though it is a very rare occurrence. Which of the following is the term for this phenomenon?

a. Intuition insight
b. Confirmation bias
c. Belief perseverance

d. Mental set
e. Availability heuristic

Practice FRQs

1. Identify one disadvantage and one advantage each, of using algorithms and heuristics when looking for an item in the grocery store.

Answer

1 point: Algorithm disadvantage: It is very time consuming, and you will spend much time wandering around the store looking at irrelevant items. Page 370

1 point: Heuristic disadvantage: The few places you have chosen to look may not be where the item is located in the store. Page 370

1 point: Algorithm advantage: Because it is so methodical, you are guaranteed to find the item if it is in the store. Page 370

1 point: Heuristic advantage: This method is often faster, so you will get in and out of the store faster. Page 370

2. A teacher has received false information that one of your friends is a cheater. Explain how each of the following can lead the teacher to continue in this false belief:

- Overconfidence
- Mental set
- Confirmation bias

(3 points)

Module **36 Thinking and Language**

LEARNING TARGETS

- **36-1 Describe the structural components of a language.**
- **36-2 Discuss how we acquire language, and explain the concept of *universal grammar.***
- **36-3 Discuss the milestones in language development, and identify the critical period for acquiring language.**
- **36-4 Discuss the brain areas that are involved in language processing and speech.**
- **36-5 Describe the relationship between thinking and language, and discuss the value of thinking in images.**

Imagine an alien species that could pass thoughts from one head to another merely by pulsating air molecules in the space between them. Perhaps these weird creatures could inhabit a future science fiction movie? Actually, we are those creatures! When we speak, our brain and voice apparatus transmit air pressure waves that we send banging against another's eardrum—enabling us to transfer thoughts from our brain into theirs. As cognitive scientist Steven Pinker (1998) noted, we sometimes sit for hours "listening to other people make noise as they exhale, because those hisses and squeaks contain *information*." And thanks to all those funny sounds created in our heads from the air pressure waves we send out, we get people's attention. We get them to do things. And we maintain relationships (Guerin, 2003). Depending on how you vibrate the air, you may get a scowl or a kiss.

Language is more than vibrating air—it is our spoken, written, or signed words, and the ways we combine them to communicate meaning. When I [DM] created this paragraph, my fingers on a keyboard generated electronic binary numbers that were translated into the squiggles in front of you. When transmitted by reflected light rays into your retina, these squiggles trigger formless nerve impulses that travel to several areas of your brain, which integrate the information, compare it to stored information, and decode meaning. Thanks to language, information is moving from my mind to yours. Many animals know little more than what they sense. Thanks to language, we comprehend much that we've never seen and that our distant ancestors never knew. Today, notes Daniel Gilbert (2006), the average taxi driver in Pittsburgh "knows more about the universe than did Galileo, Aristotle, Leonardo, or any of those other guys who were so smart they only needed one name."

language

our spoken, written, or signed words and the ways we combine them to communicate meaning.

M. SPENCER GREEN/AP Images

Language transmits knowledge Whether spoken, written, or signed, language—the original wireless communication—enables mind-to-mind information transfer, and with it the transmission of civilization's accumulated knowledge across generations.

Let’s begin our study of language by examining some of its components.

> “*The secret to our ancestors’ survival was probably our use of language to develop new modes of cooperation.*”
>
> *David Grinspoon, “Can Humans Outsmart Extinction?” 2016*

Language Structure

Flip It Video: Basics of Language

36-1 What are the structural components of a language?

Consider how we might go about inventing a language. For a spoken language, we would need three building blocks:

- **Phonemes** are the smallest distinctive sound units in a language. To say *bat*, English speakers utter the phonemes *b, a,* and *t.* (Phonemes aren't the same as letters. *That* also has three phonemes—*th, a,* and *t.*) Linguists surveying nearly 500 languages have identified 869 different phonemes in human speech, but no language uses all of them (Holt, 2002; Maddieson, 1984). Those 800+ sounds "can form all the words in every language of the world," notes child language researcher Patricia Kuhl (2015). English uses about 40; other languages use anywhere from half to more than twice that many. As a general rule, consonant phonemes carry more information than do vowel phonemes. *The treth ef thes stetement shed be evedent frem thes bref demenstretien.*
- **Morphemes** are the smallest language units that carry meaning. Most morphemes combine two or more phonemes. Some are words, while others are parts of words. The word "readers," for example, contains three morphemes: "read," "er" (signaling that we mean "one who reads"), and "s" (signaling that we mean not one, but multiple readers). Every word in a language contains one or more morphemes.
- **Grammar** is a language's set of rules that enable people to communicate. Grammatical rules guide us in deriving meaning from sounds *(semantics)* and in ordering words into sentences *(syntax).*

phoneme

in a language, the smallest distinctive sound unit.

morpheme

in a language, the smallest unit that carries meaning; may be a word or a part of a word (such as a prefix).

grammar

in a language, a system of rules that enables us to communicate with and understand others. *Semantics* is the language's set of rules for deriving meaning from sounds, and *syntax* is its set of rules for combining words into grammatically sensible sentences.

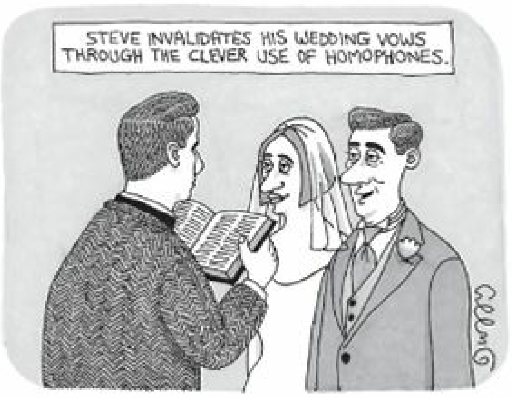
AP® EXAM TIP

It is sometimes challenging to keep these building blocks straight. Phonemes are sounds. It may help to remember that phones carry sounds. Morphemes have meaning, and both words begin with the letter *m*.

Like life constructed from the genetic code's simple alphabet, language is complexity built of simplicity. In English, for example, 40 or so phonemes can be combined to form more than 100,000 morphemes, which alone or in combination produce the 600,000 variations of past and present words in the *Oxford English Dictionary*. Using those words, we can then create an infinite number of sentences, most of which (like this one) are original. We know that you can know why we worry that you think this sentence is starting to get too complex; but that complexity—and our ability to communicate and comprehend it—is what distinguishes our human language capacity (Hauser et al., 2002; Premack, 2007).

We humans have an astonishing knack for language. With remarkable efficiency, we sample tens of thousands of words in our memory, effortlessly assemble them with near-perfect syntax, and spew them out, three words a second (Vigliocco & Hartsuiker, 2002). Seldom do we form sentences in our minds before speaking them. Rather we organize them on the fly as we speak. And while doing all this, we also adapt our utterances to our social and cultural context. One analysis of 350 billion American

English words between the years 1800 and 2000—a period of tremendous immigration—showed that language use changed to promote understanding between people from different linguistic backgrounds (Hills & Adelman, 2015). We also follow norms for speaking *(How far apart should we stand?)* and listening *(Is it OK to interrupt?)*. Given how many ways there are to mess up, it's amazing that we master this social dance. How and when does it happen?


STEVE INVALIDATES HIS WEDDING VOWS THROUGH THE CLEVER USE OF HOMOPHONES.

J.C. Duffy The New Yorker Collection/The Cartoon Bank

"Eye dew."

Check Your Understanding

Ask Yourself

- In what ways do you adapt your language to different situations (in class, among friends, with family)? Is this something you do automatically, or does it require effort?

Test Yourself

- How many morphemes are in the word *cuts?* How many phonemes?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

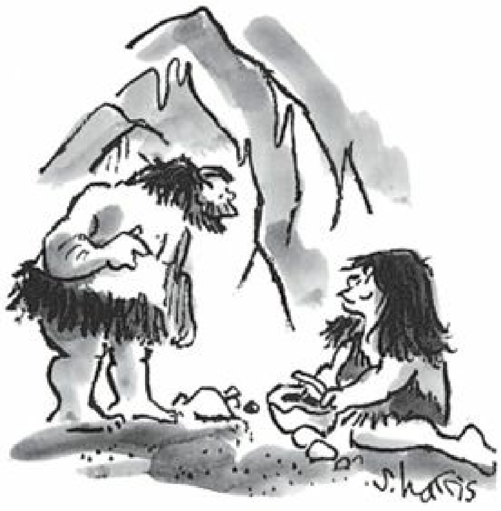
Language Acquisition and Development

To Steven Pinker (1990), language is “the jewel in the crown of cognition.” Without sight or hearing, you could still have friends and a job. But without language, could you have these things? If you were able to retain only one cognitive ability, make it language, suggested researcher Lera Boroditsky (2009): “Language is so fundamental to our experience, so deeply a part of being human, that it’s hard to imagine life without it.”

Language Acquisition: How Do We Learn Language?

36-2 How do we acquire language, and what is *universal grammar*?

Linguist Noam Chomsky has argued that language is nature’s gift—an unlearned human trait, separate from other parts of human cognition. He theorized that a built-in predisposition to learn grammar rules, which he called *universal grammar*, helps explain why preschoolers pick up language so readily and use grammar so well. It happens so naturally—as naturally as birds learn to fly—that training hardly helps.



Sidney Harris

“Got idea. Talk better. Combine words. Make sentences.”

Other researchers note that nurture matters, too—that children learn grammar as they discern patterns in the language they hear (Ibbotson &

Tomasello, 2016). And even Chomsky agrees that we are not born with a built-in *specific* language or *specific* set of grammatical rules. The world's languages are structurally very diverse—more so than the universal grammar idea implies (Bergen, 2014). But all human languages—and there are more than 6000 of them—have nouns, verbs, and adjectives as grammatical building blocks, and order and utter words in some common ways (Blasi et al., 2016; Futrell et al., 2015). Whatever language we experience as children, whether spoken or signed, we will readily learn its specific grammar and vocabulary (Bavelier et al., 2003). And no matter what language we learn, we start speaking it mostly in nouns *(kitty, da-da)* rather than in verbs and adjectives (Bornstein et al., 2004). Biology and experience work together.

Language Development: When Do We Learn Language?

36-3 What are the milestones in language development, and when is the critical period for acquiring language?

Make a quick guess: How many words of your native language did you learn between your first birthday and your high school graduation? Although you use only 150 words for about half of what you say, you probably learned about 60,000 words (Bloom, 2000; McMurray, 2007). That averages (after age 2) nearly 3500 words each year, or nearly 10 each day! How you did it—how those 3500 words could so far outnumber the roughly 200 words your schoolteachers consciously taught you each year —is one of the great human wonders.

© Susan Meiselas/Magnum Photos

Creating a language Brought together as if on a desert island (actually a school), Nicaragua’s young deaf children over time drew upon sign gestures from home to create their own Nicaraguan Sign Language, complete with words and intricate grammar. Our biological predisposition for language does not create language in a vacuum. But activated by a social context, nature and nurture work creatively together (Osborne, 1999; Sandler et al., 2005; Senghas & Coppola, 2001).

Could you even now state the rules of syntax (the correct way to string words together to form sentences) for the language(s) you speak fluently? Most of us cannot. Yet before you were able to add 2 + 2, you were creating your own original sentences and applying these rules. As a preschooler, you comprehended and spoke with a facility that would put to shame college students struggling to learn a new language.

Receptive Language

Children’s language development moves from simplicity to complexity. Infants start without language (*in fantis* means “not speaking”). Yet by 4 months of age, babies can recognize differences in speech sounds (Stager & Werker, 1997). They can also read lips. We know this because in experiments, babies have preferred looking at a face that matches a sound—an *ah* coming from wide open lips and an *ee* from a mouth with corners pulled back (Kuhl & Meltzoff, 1982). Recognizing such differences marks the beginning of the development of babies’ *receptive language*, their ability to understand what is said to and about them.

Infants’ language comprehension greatly outpaces their language production. Even at 6 months, long before speaking, many infants recognize object names (Bergelson & Swingley, 2012, 2013). At 7 months and beyond, they grow in their power to segment spoken sounds into individual words. When adults listen to an unfamiliar language, the syllables all run together. A young Sudanese couple new to North America and unfamiliar with English might, for example, hear *United Nations* as “Uneye Tednay Shuns.” Their 7-month-old daughter would not have this problem. Human infants display a remarkable ability to learn statistical aspects of human speech (Erickson & Thiessen, 2015; Werker et al., 2012). Their brains not only discern word breaks, they statistically analyze which syllables—as in *hap-py-ba-by*—most often go together. After just two minutes of exposure to a computer voice speaking an unbroken, monotone string of nonsense syllables *(bidakupadotigolabubidaku . . .),* 8-month-olds were able to recognize (as indicated by their attention) three-syllable sequences that appeared repeatedly (Saffran, 2009; Saffran et al., 1996).

Productive Language

Long after the beginnings of receptive language, babies’ *productive language*—their ability to produce words—matures. Before nurture molds babies’ speech, nature enables a wide range of possible sounds in the **babbling stage**, beginning around 4 months. Many of these spontaneously uttered sounds are consonant-vowel pairs formed by simply bunching the tongue in the front of the mouth *(da-da, na-na, ta-ta)* or by opening and closing the lips *(ma-ma),* both of which babies do naturally for feeding (MacNeilage & Davis, 2000). Babbling does not imitate the adult speech babies hear—it includes sounds from various languages. From this early babbling, a listener could not identify an infant as being, say, French, Korean, or Ethiopian.

babbling stage

beginning around 4 months, the stage of speech development in which an infant spontaneously utters various sounds at first unrelated to the household language.

By about 10 months old, infants' babbling has changed so that a trained ear can identify the household language (de Boysson-Bardies et al., 1989). Deaf infants who observe their deaf parents signing begin to babble more with their hands (Petitto & Marentette, 1991). Without exposure to other languages, babies lose their ability to discriminate and produce sounds and tones found outside their native language (Kuhl et al., 2014; Meltzoff et al., 2009). Thus, by adulthood, those who speak only English cannot discriminate certain sounds in Japanese speech. Nor can Japanese adults with no training in English hear the difference between the English *r* and *l*. For a Japanese-speaking adult, *la-la-ra-ra* may sound like the same syllable repeated.

Around their first birthday, most children enter the **one-word stage**. They have already learned that sounds carry meanings, and if repeatedly trained to associate, say, *fish* with a picture of a fish, 1-year-olds will look at a fish when a researcher says, "Fish, fish! Look at the fish!" (Schafer, 2005). They now begin to use sounds—usually only one barely recognizable syllable, such as *ma* or *da*—to communicate meaning. But family members learn to understand, and gradually the infant's language conforms more to the family's language. Across the world, baby's first words are often nouns that label objects or people (Tardif et al., 2008). At this one-word stage, a single inflected word *("Doggy!")* may equal a sentence *("Look at the dog out there!")*.

one-word stage

the stage in speech development, from about age 1 to 2, during which a child speaks mostly in single words.

At about 18 months, children's word learning explodes from about a word per week to a word per day. By their second birthday, most have entered the **two-word stage** (**Table 36.1**). They start uttering two-word sentences in **telegraphic speech**. Like yesterday's telegrams that charged by the word (TERMS ACCEPTED. SEND MONEY), a 2-year-old's speech contains mostly nouns and verbs *("Want juice")*. Also like telegrams, their speech follows rules of syntax, arranging words in a sensible order. English-speaking children typically place adjectives before nouns—*white house* rather than *house white*. Spanish reverses this order, as in *casa blanca*.

two-word stage

beginning about age 2, the stage in speech development during which a child speaks mostly in two-word statements.

telegraphic speech

early speech stage in which a child speaks like a telegram—"go car"—using mostly nouns and verbs.

TABLE 36.1 Summary of Language Development

Month (approximate)	Stage
4	Babbles many speech sounds ("ah-goo")
10	Babbling resembles household language ("ma-ma")
12	One-word speech ("Kitty!")
24	Two-word speech ("Get ball.")
24+	Rapid development into complete sentences

Moving out of the two-word stage, children quickly begin uttering longer phrases (Fromkin & Rodman, 1983). By early elementary school, they understand complex sentences and begin to enjoy the humor conveyed by double meanings: "You never starve in the desert because of all the sand-which-is there."

Critical Periods

Some children—such as those who receive a cochlear implant to enable hearing, or those who are adopted by a family in another country—get a late start on learning a particular language. For these late bloomers, language development follows the same sequence, although usually at a faster pace (Ertmer et al., 2007; Snedeker et al., 2007). But there is a limit on how long language learning can be delayed. Childhood seems to represent a *critical* (or "sensitive") *period* for mastering certain aspects of language before the language-learning window gradually closes (Hernandez & Li, 2007; Lenneberg, 1967). Later-than-usual exposure—at age 2 or 3—unleashes the idle language capacity of a child's brain, producing a rush of language. But by about age 7, those who have not been exposed to either a spoken or a signed language lose their ability to master *any* language. And children exposed to low-quality language—such as 4-year-olds in classrooms with 3-year-olds, or some children from impoverished homes—often display less language skill (Ansari et al., 2015; Hirsh-Pasek et al., 2015).

Purestock/AGE Fotostock

A natural talent Human infants come with a remarkable capacity to soak up language. But the particular language they learn will reflect their unique interactions with others.

Thanks to the shared human ability to learn language, Europeans and

Native Australia–New Zealand populations—groups who have been geographically separated for 50,000 years—can readily learn each other's languages (Chater et al., 2009). But if they learn that new language as adults, they will usually speak it with the accent of their native language, and they will also have difficulty mastering the new grammar. In one experiment, Korean and Chinese immigrants considered 276 English sentences ("*Yesterday the hunter shoots a deer*") and decided whether they were grammatically correct or incorrect (Johnson & Newport, 1991). All had been in the United States for approximately 10 years: Some had arrived in early childhood, others as adults. As **Figure 36.1** reveals, those who learned their second language early learned it best.

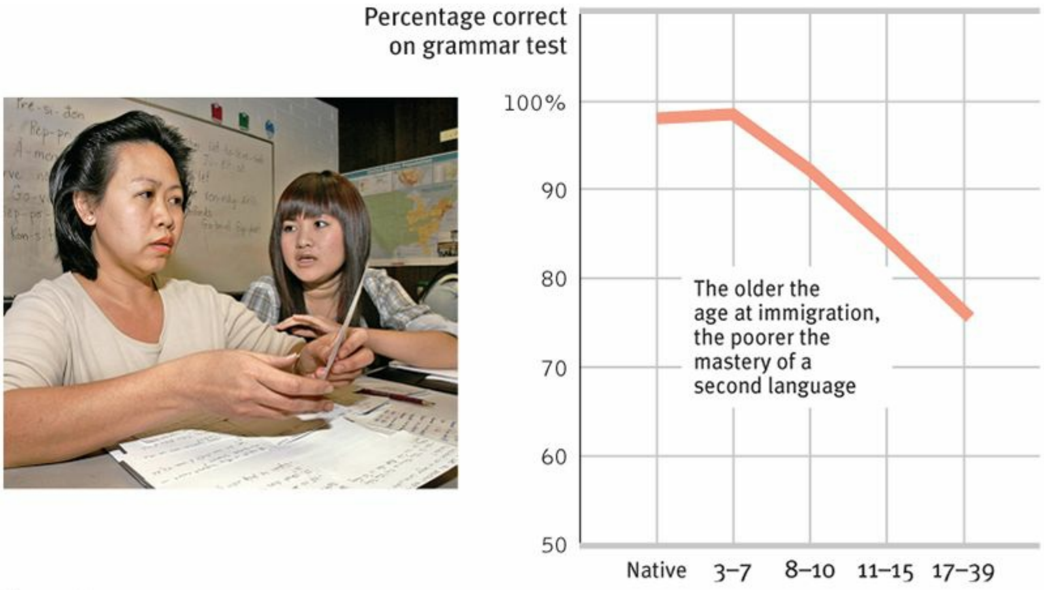


Figure 36.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Johnson & Newport, 1991.
Photo: A.E. Araiza/AP Images

Figure 36.1 Our ability to learn a new language diminishes with age

Ten years after coming to the United States, Asian immigrants took an English grammar test. Although there is no sharply defined critical period for second language learning, those who arrived before age 8 understood American English grammar as well as native speakers did. Those who arrived later did not.

The older people are when moving to a new country, the harder it is to learn its language and to absorb its culture (Cheung et al., 2011; Hakuta et al., 2003). Cognitive psychologist Stephen Kosslyn (2008) summed it up nicely: “Children can learn multiple languages without an accent and with good grammar, if they are exposed to the language before puberty. But after puberty, it’s very difficult to learn a second language so well. Similarly, when I first went to Japan, I was told not even to bother trying to bow, that there were something like a dozen different bows and I was always going to ‘bow with an accent.’”

> “ *Childhood is the time for language, no doubt about it. Young children, the younger the better, are good at it; it is child’s play. It is a onetime gift to the species.* ”
>
> *Lewis Thomas,* The Fragile Species, *1992*

Deafness and Language Development

The impact of early experiences is evident in language learning in prelingually (before learning language) deaf children born to hearing-nonsigning parents. These children typically do not experience language during their early years. Natively deaf children who learn sign language after age 9 never learn it as well as those who learned it early in life. They also never learn English as well as other natively deaf children who learned sign in infancy (Mayberry et al., 2002). Those who learn to sign as teens or adults are like immigrants who learn English after childhood: They can master basic words and learn to order them, but they never become as fluent as native signers in producing and comprehending subtle grammatical differences (Newport, 1990). As a flower’s growth will be stunted without nourishment, so, too, children will typically become linguistically stunted if isolated from language during the critical period for its acquisition.

George Ancona

Don't means *Don't*—no matter how you say it! Deaf children of deaf-signing parents and hearing children of hearing parents have much in common. They develop language skills at about the same rate, and they are equally effective at opposing parental wishes and demanding their way.

More than 90 percent of all deaf children are born to hearing parents. Most of these parents want their children to experience their world of sound and talk. Cochlear implants enable this by converting sounds into electrical signals and stimulating the auditory nerve by means of electrodes threaded into the child's cochlea. But if an implant is to help children become proficient in oral communication, parents cannot delay the surgery until their child reaches the age of consent. Giving cochlear implants to children is hotly debated. Deaf culture advocates object to giving implants to children who were deaf prelingually. The National Association of the Deaf, for example, argues that deafness is *not* a disability because native signers are not linguistically disabled. More than five decades ago, Gallaudet University linguist William Stokoe (1960) showed that sign is a complete language with its own grammar, syntax, and meanings.

Deaf culture advocates sometimes further contend that deafness could as well be considered "vision enhancement" as "hearing impairment." Close your eyes and immediately you, too, will notice your attention being drawn to your other senses. In one experiment, people who had spent 90 minutes sitting quietly blindfolded became more accurate in their location of sounds (Lewald, 2007). When kissing, lovers minimize distraction and increase sensitivity by closing their eyes.

People who lose one channel of sensation compensate with a slight enhancement of their other sensory abilities (Backman & Dixon, 1992; Levy & Langer, 1992). Those who have been deaf from birth exhibit enhanced visual processing (Almeida et al., 2015). Their auditory cortex, starved for sensory input, remains largely intact but becomes responsive to touch and to visual input (Karns et al., 2012). Once repurposed, the auditory cortex becomes less available for hearing—which helps explain why cochlear implants are most effective when given before age 2 (Geers & Nicholas, 2013; Niparko et al., 2010).

Living in a Silent World

Worldwide, 360 million people live with hearing loss (WHO, 2013). Some are profoundly deaf; most (more men than women) have hearing loss (Agrawal et al., 2008). Some were deaf from birth; others have known the hearing world. Some sign and identify with the language-based Deaf culture. Others, especially those who lost their hearing after speaking a language, are "oral" and converse with the hearing world by reading lips or written notes. Still others move between the two cultures.

Andy Richter/Aurora Photos

Hearing improved A boy in Malawi experiences new hearing aids.

The challenges of life without hearing may be greatest for children. Unable to communicate in customary ways, signing playmates may struggle to coordinate their play with speaking playmates. School achievement may also suffer; academic subjects are rooted in *spoken* languages. Adolescents may feel socially excluded, with a resulting low self-confidence. Deaf children who grow up around other deaf people more often identify with Deaf culture and feel positive self-esteem. If raised in a signing household, whether by deaf or hearing parents, they also express higher self-esteem and feel more accepted (Bat-Chava, 1993, 1994).

Adults who lose hearing late in life also face challenges. Expending effort to hear words drains their capacity to perceive, comprehend, and remember them (Wingfield et al., 2005). In several studies, people with hearing loss, especially those not wearing hearing aids, have reported feeling sadder, being less socially engaged, and more often experiencing others' irritation (Chisolm et al., 2007; Fellinger et al., 2007; Kashubeck-West & Meyer, 2008; National Council on Aging, 1999). They also may experience a sort of shyness: "It's almost universal among the deaf to want to cause hearing people as little fuss as possible," observed Henry Kisor (1990, p. 244), a Chicago newspaper editor and columnist who lost his hearing at age 3. "We can be self-effacing and diffident to the point of invisibility. Sometimes this tendency can be crippling. I must fight it all the time." Helen Keller, both blind and deaf, noted that "blindness cuts people off from things. Deafness cuts people off from people."

I [DM] understand. My mother, with whom we communicated by writing notes on an erasable "magic pad," spent her last dozen years in an utterly silent world, largely withdrawn from the stress and strain of trying to interact with people outside a small circle of family and old friends. My own hearing is declining on a trajectory toward hers (with my hearing aids out at night, I cannot understand my wife speaking from her adjacent pillow). Even with hearing aids, I sit front and center at plays and meetings and seek quiet corners in restaurants. I do benefit from cool technology (see hearingloop.org) that, at the press of a button, can transform my hearing aids into in-the-ear loudspeakers for the broadcast of phone, TV, and public address system sound. Yet I still experience frustration when, with or without hearing aids, I can't hear the joke everyone else is guffawing over; when, after repeated tries, I just can't catch that exasperated person’s question and can’t fake my way around it; when family members give up and say, “Oh, never mind” after trying three times to tell me something unimportant.

As she aged, my mother came to feel that seeking social interaction was simply not worth the effort. I share newspaper columnist Kisor’s belief that language-enabled communication is worth the effort (p. 246): “So, . . . I will grit my teeth and plunge ahead.” To reach out, to connect, to communicate with others, even across a chasm of silence, is to affirm our humanity as social creatures.

✓ Check Your Understanding

Ask Yourself

- Consider a language you began to learn *after* learning your first language (if you later learned to speak a second language at home, if you are learning a second language at school, or if you just picked up some words or phrases from a new language while traveling). How did your learning this other language differ from learning your first language? Does speaking it feel different?

Test Yourself

- What was the premise of researcher Noam Chomsky’s work in language development?
- Why is it so difficult to learn a new language in adulthood?
- What is the difference between *receptive* and *productive* language, and when do children normally hit these milestones in language development?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

The Brain and Language

36-4 What brain areas are involved in language processing and speech?

We think of speaking and reading, or writing and reading, or singing and speaking as merely different examples of the same general ability—language. But consider this curious finding: Damage to any of several cortical areas can produce **aphasia**, impairment of language. Even more curious, some people with aphasia can speak fluently but cannot read (despite good vision). Others can comprehend what they read but cannot speak. Still others can write but not read, read but not write, read numbers but not letters, or sing but not speak. These cases suggest that language is complex, and that different brain areas must serve different language functions.

aphasia

impairment of language, usually caused by left hemisphere damage either to Broca's area (impairing speaking) or to Wernicke's area (impairing understanding).

Indeed, in 1865, French physician Paul Broca confirmed a fellow physician's observation that after damage to an area of the *left frontal lobe* (later called **Broca's area**) a person would struggle to *speak* words, yet could sing familiar songs and comprehend speech. A decade later, German investigator Carl Wernicke discovered that after damage to a specific area of the left temporal lobe (**Wernicke's area**), people were unable to *understand* others' words and could speak only meaningless sentences. Asked to describe a picture that showed two boys stealing cookies behind a woman's back, one patient responded: "Mother is away her working her work to get her better, but when she's looking the two boys looking the other part. She's working another time" (Geschwind, 1979).

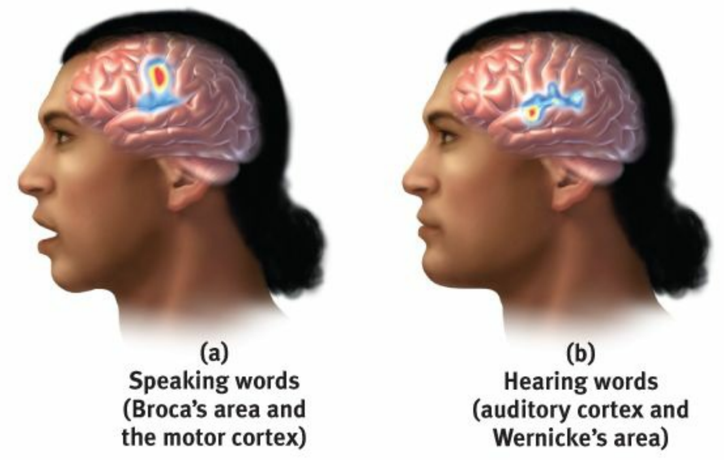
Broca’s area

helps control language expression—an area of the frontal lobe, usually in the left hemisphere, that directs the muscle movements involved in speech.

Wernicke’s area

a brain area involved in language comprehension and expression; usually in the left temporal lobe.

Today’s neuroscience has confirmed brain activity in Broca’s and Wernicke’s areas during language processing (**Figure 36.2**). But we also now know that the brain’s processing of language is complex. Broca’s area coordinates the brain’s processing of language in other areas as well (Flinker et al., 2015; Tremblay & Dick, 2016). Although you experience language as a single, unified stream, functional MRI scans would show that your brain is busily multitasking and networking. Different neural networks are activated by nouns and verbs (or objects and actions); by different vowels; by stories of visual versus motor experiences; by who spoke and what was said; and by many other stimuli (Perrachione et al., 2011; Shapiro et al., 2006; Speer et al., 2009). Moreover, if you’re lucky enough to be natively fluent in two languages, your brain processes them in similar areas, but in different areas if you learned a second language after the first (Berken et al., 2015). Bilingual spoken and signed language are also handled by different brain areas (Kovelman et al., 2014).


(a)
Speaking words
(Broca's area and
the motor cortex)

(b)
Hearing words
(auditory cortex and
Wernicke's area)

Figure 36.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 36.2 Brain activity when speaking and hearing words

AP® EXAM TIP

You'll notice that even though the brain was one of the major topics in Unit III, it keeps coming up. It's a good idea to go back and review what you learned previously about the brain. Rehearse frequently, and you will not have much to relearn before the AP® exam.

The point to remember: In processing language, as in other forms of information processing, the brain operates by dividing its mental functions—speaking, perceiving, thinking, remembering—into subfunctions. Your conscious experience of reading this page *seems* indivisible. But thanks to your parallel processing, many different neural networks are pooling their work to give the string of words coherence and meaning (Fedorenko et al., 2016). *E pluribus unum:* Out of many, one. We saw this also in Module 18's discussion of vision, for which the brain engages specialized subtasks, such as discerning depth, movement, form, and color. And in vision as in language, a localized trauma that destroys one of these neural work teams may cause people to lose just one aspect of processing. In visual processing, a stroke may destroy the ability to perceive movement but not color. In language processing, a stroke may impair the ability to speak distinctly without harming the ability to read.

> “*It is the way systems interact and have a dynamic interdependence that is—unless one has lost all sense of wonder—quite awe-inspiring.*”
>
> *Simon Conway Morris,* “ The Boyle Lecture,” *2005*

* * *

Returning to our debate about how deserving we humans are the label *Homo sapiens*, let’s pause to issue an interim report card. On decision making and risk assessment, our smart but error-prone species might rate a B–. On problem solving, where humans are inventive yet vulnerable to confirmation bias and fixation, we would probably receive a better grade, perhaps a B+. On cognitive efficiency, our quick (though sometimes faulty) heuristics would earn us an A. And when it comes to our creativity, and our learning and using language, the awestruck experts would surely award the human species an A+.

✓ Check Your Understanding

Ask Yourself

- There has been controversy at some universities about allowing fluency in sign language to fulfill a second-language requirement for an undergraduate degree. As you start planning for your own college years, what is your opinion?

Test Yourself

- If children are not yet speaking, is there any reason to think they would benefit from parents and other caregivers reading to them?
- ________________ ________________ is one part of the brain that, if damaged, might impair your ability to speak words. Damage to ________________ ________________ might impair your ability to understand language.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Language and Thought

36-5 What is the relationship between thinking and language, and what is the value of thinking in images?

Thinking and language—which comes first? This is one of psychology's great chicken-and-egg questions. Do our ideas come first and then the words to name them? Or are our thoughts conceived in words and unthinkable without them?

TRY THIS

To find out what we have learned about thinking and language in other animals, see Module 83.

TRY THIS

Before reading on, use a pen or pencil to sketch this idea: "The girl pushes the boy." Now see the footnoted comment below.[1]

Linguist Benjamin Lee Whorf (1956) contended that "language itself shapes a [person's] basic ideas." The Hopi, who have no past tense for their verbs, could not readily *think* about the past, he said. Today's psychologists believe that a strong form of Whorf's idea—**linguistic determinism**—is too extreme. We all think about things for which we have no words. (Can you think of a shade of blue you cannot name?) And we routinely have *unsymbolized* (wordless, imageless) thoughts, as when someone, while watching two men carry a load of bricks, wondered whether the men would drop them (Heavey & Hurlburt, 2008; Hurlburt et al., 2013).

linguistic determinism

the strong form of Whorf's hypothesis—that language controls the way we think and interpret the world around us.

Nevertheless, a weaker version of linguistic determinism—**linguistic influence**—rightly emphasizes that our words affect our thinking (Gentner, 2016). To those who speak two dissimilar languages, such as English and Japanese, it seems obvious that a person may think differently in different languages (Brown, 1986). Unlike English, which has a rich vocabulary for self-focused emotions such as anger, Japanese has more words for interpersonal emotions such as sympathy (Markus & Kitayama, 1991). Many bilingual individuals report that they have different senses of self—that they feel like different people—depending on which language they are using (Matsumoto, 1994; Pavlenko, 2014). In one series of studies with bilingual Israeli Arabs (who spoke both Arabic and Hebrew), participants thought differently about their social world, with differing automatic associations with Arabs and Jews, depending on which language the testing session used (Danziger & Ward, 2010). Depending on which emotion they want to express, bilingual people often switch languages. "When my mom gets angry at me, she'll speak in Mandarin," explained one Chinese-American student. "If she's really mad, she'll switch to Cantonese" (Chen et al., 2012). Bilingual individuals may even reveal different personality profiles when taking the same test in two languages, with their differing cultural associations (Chen & Bond, 2010; Dinges & Hull, 1992). When China-born, bilingual University of Waterloo students were asked to describe themselves in English, their responses fit typical Canadian profiles, expressing mostly positive self-statements and moods. When responding in Chinese, the same students gave typically Chinese self-descriptions, reporting more agreement with Chinese values and roughly equal positive and negative self-statements and moods (Ross et al., 2002). Similar attitude and personality changes have been shown when bicultural, bilingual people shift between the cultural frames associated with Spanish and English, or Arabic and English (Ogunnaike et al., 2010; Ramírez-Esparza et al., 2006). When responding in their second language, bilingual people's moral judgments reflect less emotion—they respond with more "head" than "heart" (Costa et al., 2014). "Learn a new language and get a new soul," says a Czech proverb.

linguistic influence
the weaker form of "linguistic relativity"—the idea that language *affects* thought (thus our thinking and world view is "relative to" our cultural language).

So our words do *influence* our thinking (Boroditsky, 2011). Words define our mental categories. In Brazil, the isolated Piraha people have words for the numbers 1 and 2, but numbers above that are simply "many." Thus, if shown 7 nuts in a row, they find it difficult to lay out the same number from their own pile (Gordon, 2004).

Words also influence our thinking about colors. Whether we live in New Mexico, New South Wales, or New Guinea, we *see* colors much the same, but we use our native language to *classify* and *remember* them (Davidoff, 2004; Roberson et al., 2004, 2005). Imagine viewing three colors and calling two of them "yellow" and one of them "blue." Later you would likely see and recall the yellows as being more similar. But if you speak the language of Papua New Guinea's Berinmo tribe, which has words for two different shades of yellow, you would more speedily perceive and better recall the variations between the two yellows. And if your language is Russian, which has distinct names for various shades of blue, such as *goluboy* and *siniy*, you might recall the yellows as more similar and remember the blue better. Words matter.

Prisma Bildagentur AG/Alamy

Culture and color In Papua New Guinea, Berinmo children have words for different shades of "yellow," which might enable them to spot and recall yellow variations more quickly. Here and everywhere, "the languages we speak profoundly shape the way we think, the way we see the world, the way we live our lives," noted psychologist Lera Boroditsky (2009).

Perceived differences grow as we assign different names. On the color spectrum, blue blends into green—until we draw a dividing line between the portions we call "blue" and "green." Although equally different on the color spectrum, two different items that share the same color name (as the two "blues" do in **Figure 36.3**, contrast B) are harder to distinguish than two items with different names ("blue" and "green," as in Figure 36.3, contrast A) (Özgen, 2004). Likewise, two places seem closer and more vulnerable to the same natural disaster if labeled as in the same state rather than at an equal distance in adjacent states (Burris & Branscombe, 2005; Mishra & Mishra, 2010). Tornadoes don't know about state lines, but people do.

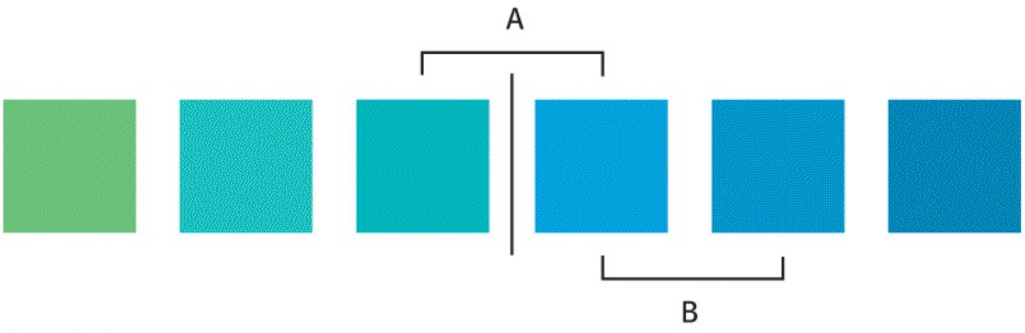


Figure 36.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 36.3 **Language and perception**

When people view blocks of equally different colors, they perceive those with different names as more different. Thus the "green" and "blue" in contrast A may appear to differ more than the two equally different blues in contrast B (Özgen, 2004).

Given words' subtle influence on thinking, we do well to choose our words carefully. Is "A child learns language as *he* interacts with *his* caregivers" any different from "Children learn language as *they* interact with *their* caregivers"? Many studies have found that it is. When hearing the generic *he* (as in "the artist and his work") people are more likely to picture a male (Henley, 1989; Ng, 1990). If *he* and *his* were truly gender free, we shouldn't skip a beat when hearing that "man, like other mammals, nurses his young."

To expand language is to expand the ability to think. As Unit IX points out, young children's thinking develops hand in hand with their language (Gopnik & Meltzoff, 1986). Indeed, it is very difficult to think about or conceptualize certain abstract ideas (*commitment, freedom,* or *rhyming*) without language. And what is true for preschoolers is true for everyone: *It pays to increase your word power*. That's why most textbooks, including this one, introduce new words—to teach new ideas and new ways of thinking. And that's also why psychologist Steven Pinker (2007) titled his book on language *The Stuff of Thought.*

Increased word power helps explain what McGill University researcher Wallace Lambert has called the *bilingual advantage* (Lambert, 1992; Lambert et al., 1993). In some studies (though not all), bilingual people have exhibited skill at inhibiting one language while using the other—for example inhibiting "crayón amarillo" from home speech while saying "yellow crayon" at school (Bialystok et al., 2015; de Bruin et al., 2015a,b). And thanks to their well-practiced "executive control" over language, they also more readily inhibit their attention to irrelevant information (Barac et al., 2016; Kroll & Bialystok, 2013). This superior attentional control is evident from 7 months of age into adulthood and even helps protect against cognitive decline in later life (Bak et al., 2014; Bialystok et al., 2012; Kroll et al., 2014). Bilingual children also exhibit enhanced social skill, by being better able to shift to understand another's perspective (Fan et al., 2015).

Bilingual people's switching between different languages does, however, take a moment (Kleinman & Gollan, 2016; Palomar-García et al., 2015). That's a phenomenon I [DM] failed to realize before speaking to bilingual Chinese colleagues in Beijing. While I spoke in English, my accompanying slides were in Chinese. Alas, I later learned, the translated slides required constant "code switching" from my spoken words, thus making it *hard* for my audience to process both.

Lambert helped devise a Canadian program that has, since 1981, immersed millions of English-speaking children in French (Statistics Canada, 2013). Not surprisingly, the children attain a natural French fluency unrivaled by other methods of language teaching. Moreover, compared with similarly capable children in control groups, they do so without detriment to their English fluency, and with increased aptitude scores, creativity, and appreciation for French-Canadian culture (Genesee & Gándara, 1999; Lazaruk, 2007).

Whether we are in the linguistic minority or majority, language links us to one another. Language also connects us to the past and the future. "To destroy a people," goes a saying, "destroy their language."

Thinking in Images

When you are alone, do you talk to yourself? Is "thinking" simply conversing with yourself? Words do convey ideas. But sometimes ideas precede words. To turn on the cold water in your bathroom, in which direction do you turn the handle? To answer, you probably thought not in words but with *implicit* (nondeclarative, procedural) memory—a mental picture of how you do it.

Indeed, we often think in images. Artists think in images. So do composers, poets, mathematicians, athletes, and scientists. Albert Einstein reported that he achieved some of his greatest insights through visual images and later put them into words. Pianist Liu Chi Kung harnessed the power of thinking in images. One year after placing second in the 1958 Tchaikovsky piano competition, Liu was imprisoned during China’s cultural revolution. Soon after his release, after seven years without touching a piano, he was back on tour. Critics judged Liu’s musicianship as better than ever. How did he continue to develop without practice? “I did practice,” said Liu, “every day. I rehearsed every piece I had ever played, note by note, in my mind” (Garfield, 1986).

For someone who has learned a skill, such as ballet dancing, even *watching* the activity will activate the brain’s internal simulation of it, reported one British research team (Calvo-Merino et al., 2004). So, too, will *imagining* a physical experience, which activates some of the same neural networks that are active during the actual experience (Grèzes & Decety, 2001). Small wonder, then, that mental practice has become a standard part of training for Olympic athletes (Blumenstein & Orbach, 2012; Ungerleider, 2005).

One experiment on mental practice and basketball free-throw shooting tracked the University of Tennessee women’s team over 35 games (Savoy & Beitel, 1996). During that time, the team’s free-throw accuracy increased from approximately 52 percent in games following standard physical practice, to some 65 percent after mental practice. Players had repeatedly imagined making free throws under various conditions, including being “trash-talked” by their opposition. In a dramatic conclusion, Tennessee won the national championship game in overtime, thanks in part to their free-throw shooting.

Mental rehearsal can also help you achieve an academic goal, as researchers demonstrated with two groups of introductory psychology students facing a midterm exam one week later (Taylor et al., 1998). (Students who were not engaged in any mental rehearsal formed a control group.) The first group spent five minutes each day visualizing themselves scanning the posted grade list, seeing their A, beaming with joy, and feeling proud. This daily *outcome simulation* had little effect, adding only 2 points to their exam-score average. The second group spent five minutes each day visualizing themselves effectively studying—reading the textbook, going over notes, eliminating distractions, declining an offer to go out. This daily *process simulation* paid off: The group began studying sooner, spent more time at it, and beat the others' average score by 8 points. *The point to remember:* It's better to spend your fantasy time planning *how* to reach your goal than to focus on your desired destination.

Blend Images/Getty Images

* * *

What, then, should we say about the relationship between thinking and language? As we have seen, language influences our thinking. But if thinking did not also affect language, there would never be any new words. And new words and new combinations of old words express new ideas. The basketball term *slam dunk* was coined after the act itself had become fairly common. *Blogs* became part of our language after web logs appeared. So, let us say that *thinking affects our language, which then affects our thought* (**Figure 36.4**).

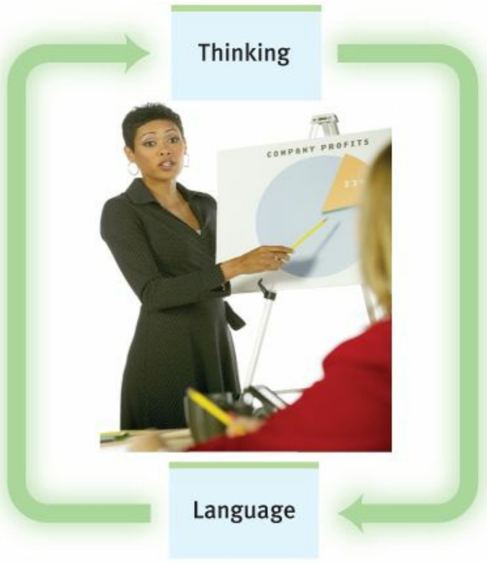


Figure 36.4
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e,
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Jupiterimages/Getty Images

Figure 36.4 The interplay of thought and language

The traffic runs both ways between thinking and language. Thinking affects our language, which affects our thought.

Psychological research on thinking and language mirrors the mixed impressions of our species by those in fields such as literature and religion. The human mind is simultaneously capable of striking intellectual failures and of striking intellectual power. Misjudgments are common and can have disastrous consequences. So we do well to appreciate our capacity for error. Yet our ingenuity at problem solving and our extraordinary power of language mark humankind as almost “infinite in faculties.”

Check Your Understanding

Ask Yourself

- Do you use certain words or gestures that only your family or closest circle of friends would understand? Can you envision using these words or gestures to construct a language, as the Nicaraguan children did in building their version of sign language?

Test Yourself

- To say that “words are the mother of ideas” assumes the truth of what concept?
- What is mental practice, and how can it help you to prepare for an upcoming event?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 36 REVIEW

36-1 What are the structural components of a language?

- *Phonemes* are a *language's* basic units of sound.
- *Morphemes* are the elementary units of meaning.
- *Grammar*—the system of rules that enables us to communicate—includes semantics (rules for deriving meaning) and syntax (rules for ordering words into sentences).

36-2 How do we acquire language, and what is *universal grammar*?

- Linguist Noam Chomsky has proposed that all human languages share a universal grammar—the basic building blocks of language—and that humans are born with a predisposition to learn language.
- As our biology and experience interact, we readily learn the specific grammar and vocabulary of the language we experience as children.

36-3 What are the milestones in language development, and when is the critical period for acquiring language?

- Language development's timing varies, but all children follow the same sequence.
- Receptive language (the ability to understand what is said to or about you) develops before productive language (the ability to produce words).
- At about 4 months of age, infants *babble*, making sounds found in languages from all over the world.
- By about 10 months, their babbling contains only the sounds found in their household language.
- Around 12 months of age, children begin to speak in single words. This *one-word stage* evolves into *two-word (telegraphic)* utterances before

their second birthday, after which they begin speaking in full sentences.

- Childhood represents a critical period for language learning, and those who have not been exposed to a spoken or signed language by age 7 lose their ability to master any language. Deaf children born to hearing-nonsigning parents often demonstrate the impact of early language experiences.

36-4 What brain areas are involved in language processing and speech?

- Two important language- and speech-processing areas are *Broca's area*, a region of the left frontal lobe that controls language expression, and *Wernicke's area*, a region in the left temporal lobe that controls language reception (and also assists with expression).
- Language processing is spread across other brain areas as well, where different neural networks handle specific linguistic subtasks.

36-5 What is the relationship between thinking and language, and what is the value of thinking in images?

- Although Benjamin Lee Whorf's *linguistic determinism* hypothesis suggested that language defines thought, it is more accurate to say that language influences thought (linguistic influence).
- Different languages embody different ways of thinking, and immersion in bilingual education can enhance thinking.
- We often think in images when we use nondeclarative (procedural) memory (our automatic memory system for motor and cognitive skills and classically conditioned associations).
- Thinking in images can increase our skills when we mentally practice upcoming events.

Multiple-Choice Questions

1. In the word "prepare," each "r" can be considered a

a. babble.
b. morpheme.
c. semantic.
d. phoneme.
e. thought.

2. Eighteen-month-old Becca is in the telegraphic speech phase. Which of the following best represents something she might say?

a. “Mama”
b. “Yogurt please”
c. “Katie fall”
d. “The dog is fuzzy”
e. “I love you mommy”

3. The prefix “pre” in “preview” or the suffix “ed” in “adapted” are examples of

a. phonemes.
b. morphemes.
c. babbling.
d. language development.
e. grammar.

4. The idea that language develops because of an inborn language acquisition device was proposed by

a. Wernicke.
b. Broca.
c. Skinner.
d. Chomsky.
e. Sternberg.

Practice FRQs

1. Consider the sentence “The small child tired was.” Apply the following terms to some element of the sentence:

- Phoneme
- Morpheme
- Semantics
- Syntax

Answer

1 point: Phonemes are the smallest distinctive sounds in a word. An example might be the “th” in the or the “ll” in small. Page 381

1 point: Morphemes are the smallest units of a word that carry meaning in language. In this sentence, each word is a morpheme but they cannot be broken down into smaller units. Page 382

1 point: Semantics is the meaning of a sentence. It is clear from the sentence that the child is tired. Page 382

1 point: Syntax represents the rules for ordering words into sentences. In this sentence the syntax is wrong because the word “was” should come before the word “tired.” Page 382

2. After an accident, Josh lost his ability to both speak and understand spoken language. Explain how the following terms relate to the situation:

- Aphasia
- Broca’s area
- Wernicke’s area.

(3 points)

UNIT VII REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

memory, p. 326
recall, p. 327
recognition, p. 327
relearning, p. 327
encoding, p. 329
storage, p. 329
retrieval, p. 329
parallel processing, p. 329
sensory memory, p. 329
short-term memory, p. 329
long-term memory, p. 329
working memory, p. 329
explicit memory, p. 330
effortful processing, p. 330
automatic processing, p. 331
implicit memory, p. 331
iconic memory, p. 332
echoic memory, p. 332
chunking, p. 333
mnemonics [nih-MON-iks], p. 333
spacing effect, p. 334
testing effect, p. 335
shallow processing, p. 335
deep processing, p. 335
semantic memory, p. 340
episodic memory, p. 340

hippocampus, p. 340
memory consolidation, p. 340
flashbulb memory, p. 342
long-term potentiation (LTP), p. 342
priming, p. 345
encoding specificity principle, p. 345
mood-congruent memory, p. 346
serial position effect, p. 347
anterograde amnesia, p. 351
retrograde amnesia, p. 351
proactive interference, p. 354
retroactive interference, p. 354
repression, p. 355
reconsolidation, p. 356
misinformation effect, p. 357
source amnesia, p. 358
déjà vu, p. 358
cognition, p. 365
concept, p. 365
prototype, p. 365
creativity, p. 366
convergent thinking, p. 366
divergent thinking, p. 366
algorithm, p. 370
heuristic, p. 370
insight, p. 370
confirmation bias, p. 371
fixation, p. 371
mental set, p. 371
intuition, p. 372
representativeness heuristic, p. 372

availability heuristic, p. 373
overconfidence, p. 375
belief perseverance, p. 376
framing, p. 376
language, p. 381
phoneme, p. 381
morpheme, p. 382
grammar, p. 382
babbling stage, p. 384
one-word stage, p. 384
two-word stage, p. 384
telegraphic speech, p. 384
aphasia, p. 387
Broca’s area, p. 388
Wernicke’s area, p. 388
linguistic determinism, p. 389
linguistic influence, p. 389

KEY CONTRIBUTORS TO REMEMBER

Hermann Ebbinghaus, p. 327
Richard Atkinson, p. 329
Richard Shiffrin, p. 329
George A. Miller, p. 332
Eric Kandel, p. 342
Elizabeth Loftus, p. 356
Robert Sternberg, p. 366
Wolfgang Köhler, p. 370
Amos Tversky, p. 372
Daniel Kahneman, p. 372
Steven Pinker, p. 381

Noam Chomsky, p. 383

Paul Broca, p. 388

Carl Wernicke, p. 388

Benjamin Lee Whorf, p. 389

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. Miller’s “magical number seven, plus or minus two” refers to

- a. the ideal number of times to rehearse information in the first encoding session.
- b. the number of seconds information stays in short-term memory without rehearsal.
- c. the capacity of short-term memory.
- d. the number of seconds information stays in echoic storage.
- e. the number of years most long-term memories last.

2. Long-term potentiation (LTP) is best described as follows:

- a. It’s easier to recognize than to recall information.
- b. Constructed memories have the potential to be either accurate or inaccurate.
- c. These synaptic changes allow for more efficient transfer of information.
- d. Implicit memories are processed by the cerebellum instead of by the hippocampus.
- e. Information is transferred from working memory to long-term memory.

3. Which of the following is an example of an implicit memory?

- a. What time you had lunch yesterday
- b. The details of an assignment that is due tomorrow
- c. Vividly recalling significant events, such as the death of a famous person.

d. The names of all U.S. state capitals
e. Recognizing names and pictures of your classmates many years after they have graduated

4. Which of the following statements concerning memory is true?

a. Hypnosis, when used as a component of therapy, usually improves the accuracy of memory.
b. One aspect of memory that is usually accurate is the source of the remembered information.
c. Children’s memories of abuse are more accurate than other childhood memories.
d. Memories we are more certain of are more likely to be accurate.
e. Memories are often a blend of correct and incorrect information.

5. The basketball players could remember the main points of their coach’s halftime talk, but not her exact words. This is because they encoded the information

a. semantically.
b. iconically.
c. implicitly.
d. shallowly.
e. automatically.

6. When someone provides his phone number to another person, he usually pauses after the area code and again after the next three numbers. This pattern underscores the importance of which memory principle?

a. Chunking
b. The serial position effect
c. Semantic encoding
d. Auditory encoding
e. Recognition

7. Research on the role of the amygdala in memory has found that

a. the amygdala help process memories of happy experiences.
b. the amygdala support Freud’s ideas about memory because they allow us to repress memories of trauma.
c. the amygdala produce long-term potentiation in the brain.
d. the amygdala help make sure we remember events that trigger strong emotional responses.
e. the amygdala are active when the retrieval of a long-term memory is primed.

8. Which of the following illustrates the serial position effect?

a. The only name Kensie remembers from the people she met at the party is Spencer, because she thought he was particularly good looking.
b. Kimia has trouble remembering information from the book’s first unit when she reviews for semester finals.
c. It’s easy for Brittney to remember that carbon’s atomic number is 6 because her birthday is on December 6.
d. Kyle was not able to remember the names of all of his new co-workers after one week on the job, but he could remember them after two weeks.
e. Alp is unable to remember the middle of a list of vocabulary words as well as he remembers the first or last words on the list.

9. By waiting until the last minute to study for an exam, you are using an unrecommended strategy called

a. imagery.
b. semantic memory.
c. distributed practice.
d. chunking.
e. massed practice.

0. You are more likely to remember happy memories when you are presently happy than when you are sad due to

a. mood congruence.

   b. context effects.
   c. state-dependency.
   d. proactive interference.
   e. retroactive interference.

1. Carl damaged his cerebellum in a car accident. As a result, he would have the most trouble remembering

   a. his new physician’s name.
   b. the time of his next doctor appointment.
   c. how to ride his therapy bike.
   d. his new license plate number.
   e. the things his wife has asked him to get at the grocery store.

2. Which of the following is an example of source amnesia?

   a. Iva can’t remember the details of a horrifying event because she has repressed them.
   b. Mary has entirely forgotten about an incident in grade school until her friend reminds her of the event.
   c. Michael can’t remember this year’s locker combination because he confuses it with last year’s combination.
   d. Stephen misremembers a dream as something that really happened.
   e. Anna, who is trying to lose weight, is unable to remember several of the between-meal snacks she had yesterday.

3. Hermann Ebbinghaus’ forgetting curve shows that

   a. most forgetting occurs early on and then levels off.
   b. we forget more rapidly as time passes.
   c. forgetting is relatively constant over time.
   d. forgetting is related to many factors, but time is not one of them.
   e. we are more likely to forget items in the middle of a list than at the beginning or the end.

4. When asked to think of a “desk,” many students think of the desks in their classroom rather than a large desk used by an executive. This illustrates that their school desks have formed their ________ of a desk.

a. phoneme
b. heuristic
c. concept
d. telegraphic utterance
e. prototype

5. People are more concerned about a medical procedure when told it has a 10 percent death rate than they are when told it has a 90 percent survival rate. Which psychological concept explains this difference in concern?

a. Belief perseverance
b. Insight
c. Intuition
d. Framing
e. Confirmation bias

6. Which of the following illustrates a heuristic?

a. Calculating the area of a rectangle by multiplying the length times the width
b. Using three dramatic news reports of corporate fraud to estimate how often business fraud occurs
c. Looking in each room of your home to find your sleeping cat
d. Following a new recipe to bake a cake for your friend
e. Trying every key on your mom’s key ring until you find the one that unlocks the seldom-used storeroom in the basement

7. Mave got a new car with the license plate “MAVNUM1.” She is asked by the school parking clerk what her number is but can only remember her old one, “VANMOM1.” Her inability to remember her new plate is most likely due to

a. retroactive interference.
b. mood congruency.
c. proactive interference.
d. anterograde amnesia.

e. retrograde amnesia.

8. Scott gets soaked in the rainstorm because he does not think of using his backpack to shield himself from the rain. Which barrier to problem solving is evidenced here?

a. Fixation
b. Insight
c. Representativeness
d. Confirmation bias
e. Availability

9. A phoneme, such as the “c” in *cows*, is best described as a

a. unit of meaning in a language.
b. form of syntax.
c. stage of language development.
d. unit of sound in a language.
e. form of telegraphic speech.

0. Alice significantly underestimated how long it would take to write her term paper because of

a. belief perseverance.
b. framing.
c. intuition.
d. the availability heuristic.
e. overconfidence.

1. Which of the following is not one of Robert Sternberg’s components of creativity?

a. A venturesome personality
b. Imaginative thinking skills
c. A creative environment
d. Incubation
e. Intrinsic motivation

2. Which of the following demonstrates the representativeness heuristic?

a. Deciding that a new kid in school is a nerd because he looks like a nerd
b. Fearing air travel because of memories of seeing plane crashes in the news
c. Checking in every drawer to find some matches because matches are usually in drawers
d. Having the solution to a word problem pop into your head because you have just successfully solved a similar problem
e. Applying for jobs in several local grocery stores because your best friend just got a job in a grocery store

3. Benjamin Lee Whorf’s linguistic determinism hypothesis relates to what aspect of the power of language?

a. How thinking determines language
b. How language determines thinking
c. The role of the language acquisition device
d. The importance of critical periods in language development
e. The development of language in nonhuman animals

4. According to Noam Chomsky, language acquisition occurs most especially because of

a. exposure to language in early childhood.
b. instruction in grammar.
c. reinforcement for babbling and other early verbal behaviors.
d. imitation and drill.
e. linguistic determinism.

Free-Response Questions

1. Jacque learned to speak Italian when she was in the first grade and was able to speak, read, and write Italian fairly well by the fourth grade. She moved to a new school system that did not have Italian as a choice for World Languages, so she decided to take Spanish. Sometimes she found herself saying and writing words in Italian as she completed her Spanish assignments. Often, she remembered the vocabulary in Italian before she said the word in Spanish. Sometimes she felt like knowing Italian helped her learn Spanish, but sometimes she thought it just confused her! When Jacque was in her Spanish classroom, she felt more at ease with the Spanish language. When she went to a French restaurant, she was frustrated because the menu was unreadable to her.

Use an example to show how each concept is related to Jacque's experiences.

- Working memory
- Explicit memory
- Effortful processing
- Context-dependent memory
- Proactive interference

Explain how these brain structures play a role in Jacque's memory processing.

- Hippocampus
- Amygdala

Rubric for Free Response Question 1

1 point: **Working memory**—Possible example: Jacque has to focus on what the teacher is saying and recall the correct vocabulary word when she is asked a question. Page 329

1 point: **Explicit memory**—Possible example: Defining vocabulary words in any language relies on explicit memory. Page 330

1 point: **Effortful processing**—Possible example: When reading, Jacque has to pay attention to new words and sentence construction to understand what is being conveyed. Page 330

1 point: **Context-dependent memory**—Possible example: Jacque seems to be able to remember her Spanish best when in her Spanish classroom. Page 345

1 point: **Proactive interference**—Possible example: Jacque learned Italian before she learned Spanish, and so sometimes her prior knowledge of Italian makes it difficult for her to recall Spanish words. Page 354

1 point: **The hippocampus**—Possible example: Since the left hippocampus is important to storage and recall of verbal information—new terms, vocabulary, and so on—Jacque's hippocampus must be very active during her language classes. Page 340

1 point: **The amygdala**—Possible example: When Jacque is stressed about mixing up her Spanish with Italian words, the stress may cause her to have trouble recalling the information because of hormones that are released. Her negative emotions, experienced in the French restaurant, may also be related to the amygdala. Page 341

2. Amelia, a high school junior, is enrolled in a public speaking course in school that requires the students to memorize several speeches they will give to the class.

Explain how the following items will help her in the course:

- Broca's area
- Echoic memory
- Mnemonics

Explain how the following will hinder her in the course:

- Syntax
- Overconfidence

(5 points)

3. George, a senior in high school, was reminiscing with his friends about their first homecoming dance. He has many good memories of the dance, but is unable to remember the songs the band played in the middle of the dance.

Explain how each of the following psychological concepts terms could *help* George’s recollection or memory of his freshman-year homecoming dance.

- Flashbulb memory
- Mood-congruent memory

Explain how each of the following psychological concepts could *hinder* George’s recollection or memory of his freshman-year homecoming dance.

- Serial position effect
- Retroactive interference
- Misinformation effect

(5 points)

UNIT **VIII Motivation, Emotion, and Stress**

Cultura Creative (RF)/Alamy

MODULES

37 Motivational Concepts

38 Hunger Motivation

39 Sexual Motivation

40 Affiliation and Achievement

41 Theories and Physiology of Emotion

42 Expressing Emotion

43 Stress and Illness

44 Health and Happiness

How well I [DM] remember asking my first discussion question in a new introductory psychology class. Several hands rose, along with one left foot. The foot belonged to Chris Klein, who was the unlikeliest person to have made it to that class. At birth, Chris suffered oxygen deprivation that required 40 minutes of CPR. “One doctor wanted to let him go,” recalled his mother.

The result was severe cerebral palsy. With damage to the brain area that controls muscle movement, Chris is unable to control his constantly moving hands. He cannot feed, dress, or care for himself. And he cannot speak. But Chris can control his keen mind and his left foot. With that blessed foot he operates the joystick on his motorized wheelchair. Using his left big toe, he can type sentences, which his communication system can store, send, or speak. And Chris has motivation—lots of motivation.

When Chris was a high school student in suburban Chicago, three teachers doubted he would be able to leave home for college. Yet he persisted, and, with much support, attended my school (Hope College). Five years later, as his left foot drove him across the stage to receive his diploma, his admiring classmates honored his achievement with a spontaneous standing ovation.

Today, Chris is an inspirational speaker for schools, churches, and community events, giving “a voice to those that have none, and a helping hand to those with disabilities.” He is writing a book, *Lessons from the Big Toe.* And he has found love and married.

Few of us face Chris Klein’s challenges. But we all seek to direct our energy in ways that will produce satisfaction and success.

We are pushed by biological motives, such as hunger and sex, and by social ones, such as affiliation and achievement. Chris Klein’s fierce will to live, learn, and love highlights the close ties between our own *motivations, emotions,* and *stress* responses, all of which energize and direct our lives.

In this unit, we explore our motivations and emotions. We also examine stress, including the health effects that can result when stress is intense or prolonged. Then we look at ways of dealing with stress and at the possibilities for a happy, flourishing life.

Unit VIII Overview Video

Module 37 Motivational Concepts

LEARNING TARGETS

- 37-1 Define *motivation* as psychologists use the term, and identify the perspectives useful for studying motivated behavior.
- 37-2 Explain how some needs are more compelling than others.

37-1 How do psychologists define *motivation*? From what perspectives do they view motivated behavior?

Flip It Video: Theories of Motivation

Our **motivations** arise from the interplay between nature (the bodily “push”) and nurture (the “pulls” from our personal experiences, thoughts, and culture). Our motives drive our behavior. That is usually, but not always, for the better. If our motivations get hijacked, our lives go awry. Those with *substance use disorder*, for example, may find their cravings for an addictive substance override their longings for sustenance, safety, and social support.

motivation

a need or desire that energizes and directs behavior.

Katie Green/MLIVE.COM/Barcroft

A motivated man: Chris Klein To see and hear Chris presenting his story, visit tinyurl.com/ChrisPsychStudent

In their attempts to understand motivated behavior, psychologists have viewed it from four perspectives:

- *Instinct theory* (now replaced by the *evolutionary perspective*) focuses on genetically predisposed behaviors.
- *Drive-reduction theory* focuses on how we respond to our inner pushes and pulls.
- *Arousal theory* focuses on finding the right level of stimulation.
- Abraham Maslow's *hierarchy of needs* focuses on the priority of some needs over others.

Instinct Theory

Early in the twentieth century, as Charles Darwin’s influence grew, it became fashionable to classify all sorts of behaviors as instincts. If people criticized themselves, it was because of their “self-abasement instinct.” If they boasted, it reflected their “self-assertion instinct.” After scanning 500 books, one sociologist compiled a list of 5759 supposed human instincts! Before long, this instinct-naming fad collapsed under its own weight. Rather than explaining human behaviors, the early instinct theorists were simply naming them. It was like “explaining” a bright child’s low grades by labeling the child an “underachiever.” To name a behavior is not to explain it.

To qualify as an **instinct**, a complex behavior must have a fixed pattern throughout a species and be unlearned (Tinbergen, 1951). Such unlearned behaviors include *imprinting* in birds (which you’ll learn more about in Module 48) and the return of salmon to their birthplace. A few human behaviors, such as infants’ innate reflexes to root for a nipple and suck (Module 45), also exhibit unlearned fixed patterns. *Instinct theory* viewed our instincts as the source of our motivations. But many more behaviors are directed by both physiological needs and psychological wants.

instinct

a complex behavior that is rigidly patterned throughout a species and is unlearned.

Left: Michael Ventura/Alamy; Right: James Warwick/Science Source

Same motive, different wiring The more complex the nervous system, the more adaptable the organism. Both humans and weaverbirds satisfy their need for shelter in ways that reflect their inherited capacities. Human behavior is flexible; we can learn whatever skills we need to build a house. The bird’s behavior pattern is fixed; it can build only this kind of nest.

Drives and Incentives

In addition to our predispositions, we have *drives*. **Physiological needs** (such as for food or water) create an aroused, motivated state—a drive (such as hunger or thirst)—that pushes us to reduce the need. **Drive-reduction theory** explains that, with few exceptions, when a physiological need increases, so does our psychological *drive to reduce it.*

physiological need

a basic bodily requirement.

drive-reduction theory

the idea that a physiological need creates an aroused state (a drive) that motivates an organism to satisfy the need.

Drive reduction is one way our bodies strive for **homeostasis** (literally “staying the same”)—the maintenance of a steady internal state. For example, our body regulates its temperature in a way similar to a room’s thermostat. Both systems operate through feedback loops: Sensors feed room temperature to a control device. If the room’s temperature cools, the control device switches on the furnace. Likewise, if our body’s temperature cools, our blood vessels constrict to conserve warmth, and we feel driven to put on more clothes or seek a warmer environment (**Figure 37.1**).

homeostasis

a tendency to maintain a balanced or constant internal state; the regulation of any aspect of body chemistry, such as blood glucose, around a particular level.

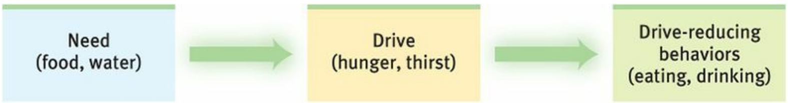


Figure 37.1

Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 37.1 Drive-reduction theory

Drive-reduction motivation arises from *homeostasis*—an organism’s natural tendency to maintain a steady internal state. Thus, if we are water deprived, our thirst drives us to drink and to restore the body’s normal state.

Not only are we *pushed* by our need to reduce drives, we also are *pulled* by **incentives**—positive or negative environmental stimuli that lure or repel us. Given such stimuli, our underlying drives, such as for food or love, become active impulses. And the more those impulses are satisfied and reinforced, the stronger the drive may become: As Roy Baumeister (2015) noted, “Getting begets wanting.” Thus, our learning influences our motives. Depending on our learning, the aroma of good food, whether roasted peanuts or toasted ants, can motivate our behavior. So can the sight of those we find attractive or threatening.

incentive

a positive or negative environmental stimulus that motivates behavior.

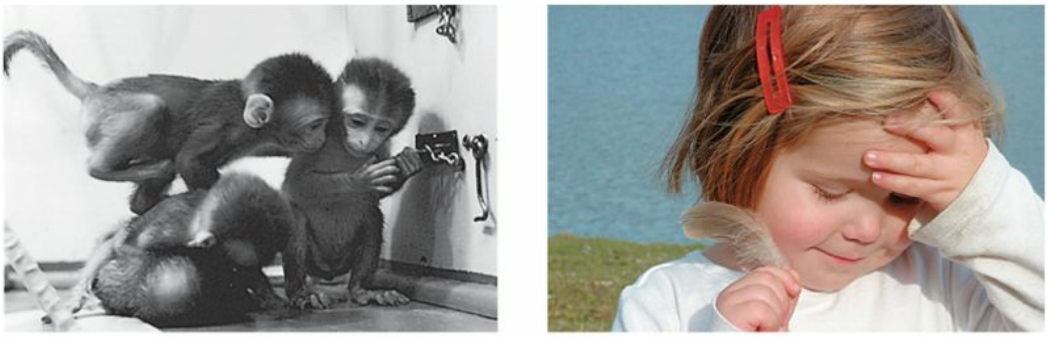
When there is both a need and an incentive, we feel strongly driven. The food-deprived person who smells pizza baking may feel a strong hunger drive, and the baking pizza may become a compelling incentive. For each motive, we can therefore ask, “How is it pushed by our inborn physiological needs and pulled by learned incentives in the environment?” (Remember from Module 29 that both *extrinsic* and *intrinsic* rewards motivate us. Thus, making a pizza may be either a means to an extrinsic paycheck, or an intrinsically satisfying home-baked pleasure.)

AP® EXAM TIP

Read carefully! Homeostasis is *not* a motivation theory, but rather a biological principle that applies to some motivational theories (such as drive-reduction theory). Make sure you can compare and contrast the motivational theories.

Arousal Theory

We are much more than calm homeostatic systems, however. Some motivated behaviors actually *increase* arousal. Well-fed animals will leave their shelter to explore and gain information, seemingly in the absence of any need-based drive. Curiosity drives monkeys to monkey around trying to figure out how to unlock a latch that opens nothing or how to open a window that allows them to see outside their room (Butler, 1954). Curiosity drives newly mobile infants to investigate every accessible corner of the house, and it drove students, in one experiment, to click on pens to see whether they did or didn't deliver an electric shock (Hsee & Ruan, 2016). It drives you to read this text; it drives the scientists whose work this text discusses. And it drives explorers and adventurers such as mountaineer George Mallory. Asked why he wanted to climb Mount Everest, Mallory famously answered, "Because it's there." Sometimes uncertainty brings excitement, which amplifies motivation (Shen et al., 2015). Those who, like Mallory, enjoy high arousal are most likely to seek out intense music, novel foods, and risky behaviors and careers (Roberti et al., 2004; Zuckerman, 1979, 2009). Although they have been called "sensation-seekers," risk takers may also be motivated to master their emotions and actions (Barlow et al., 2013).



Left: Science Source; Right: Glenn Swier

Driven by curiosity Young monkeys and children are fascinated by the unfamiliar. Their drive to explore maintains an optimum level of arousal and is one of several motives that do not fill any immediate physiological need.

So, human motivation aims not to eliminate arousal but to seek optimum levels of arousal. Having all our biological needs satisfied, we feel driven to experience stimulation. Lacking stimulation, we feel bored and look for a way to increase arousal. If left alone in a room, most people prefer to do something—even (when given no other option) to self-administer mild electric shocks (Wilson et al., 2014). Moderate anxiety can be motivating—leading to higher levels of math achievement, for example (Wang, Z., et al., 2015). However, given too much stimulation or stress, we look for a way to decrease arousal. In one experiment, people felt less stress when they cut back checking e-mail to three times a day rather than being continually accessible (Kushlev & Dunn, 2015).

Two early twentieth-century psychologists studied the relationship of arousal to performance and identified the **Yerkes-Dodson law**: *moderate arousal leads to optimal performance* (Yerkes & Dodson, 1908). When taking a test, for example, it pays to be moderately aroused—alert but not trembling with nervousness. (If already anxious, it's better not to become further aroused with caffeine.) Between bored low arousal and anxious hyperarousal lies a flourishing life. Optimal arousal levels depend on the task, with more difficult tasks requiring lower arousal for best performance (Hembree, 1988) (**Figure 37.2**).

Yerkes-Dodson law

the principle that performance increases with arousal only up to a point, beyond which performance decreases.

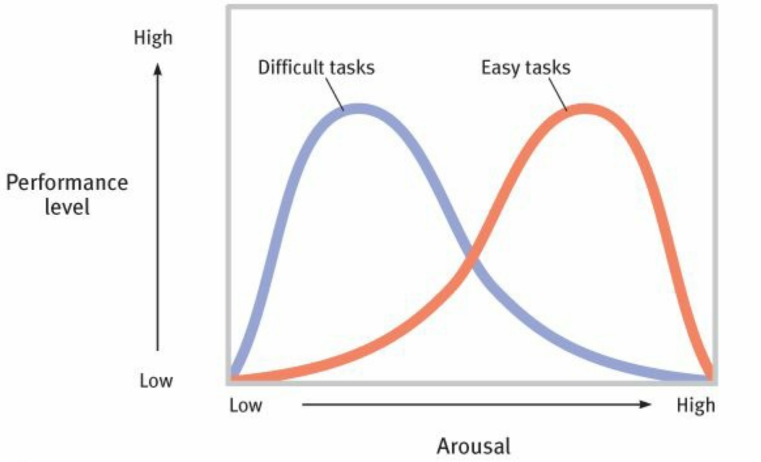


Figure 37.2
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Figure 37.2 **Arousal and performance**

✓ Check Your Understanding

Ask Yourself

- How have you helped your body achieve homeostasis today?

Test Yourself

- Performance peaks at lower levels of arousal for difficult tasks, and at higher levels for easy or well-learned tasks. (1) How might this phenomenon affect marathon runners? (2) How might this phenomenon affect anxious test-takers facing a difficult test?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

A Hierarchy of Needs

37-2 Why is the idea that some needs are more compelling than others a useful framework for thinking about motivation?

Some needs take priority. At this moment, with your needs for air and water hopefully satisfied, other motives—such as your desire to learn and achieve (discussed later in this unit, in Module 40)—are energizing and directing your behavior. Let your need for water go unsatisfied, however, and your thirst will preoccupy you. Deprived of air, you'll find that your thirst disappears.

Abraham Maslow (1970) described these priorities as a **hierarchy of needs** (**Figure 37.3**). At the base of this pyramid are our physiological needs, such as for food and water. Only if these needs are met are we prompted to meet our need for safety, and then to satisfy our needs to give and receive love and to enjoy self-esteem. Beyond this, said Maslow (1971), lies the need to actualize one's full potential. (More on self-esteem and self-actualization in Modules 57 and 59.)

hierarchy of needs
Maslow's pyramid of human needs, beginning at the base with physiological needs that must first be satisfied before higher-level safety needs and then psychological needs become active.

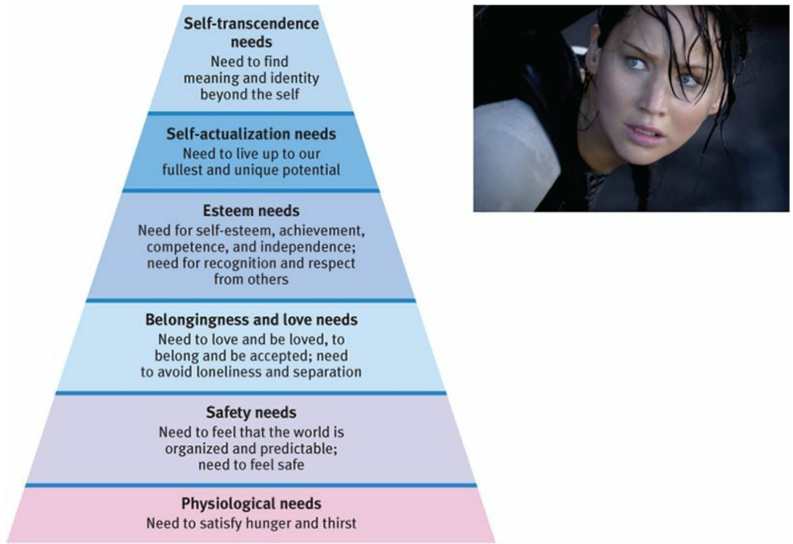

Self-transcendence needs
Need to find meaning and identity beyond the self
Self-actualization needs
Need to live up to our fullest and unique potential
Esteem needs
Need for self-esteem, achievement, competence, and independence; need for recognition and respect from others
Belongingness and love needs
Need to love and be loved, to belong and be accepted; need to avoid loneliness and separation
Safety needs
Need to feel that the world is organized and predictable; need to feel safe
Physiological needs
Need to satisfy hunger and thirst

Figure 37.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Photo: Lionsgate/Photofest © Lionsgate

Figure 37.3 Maslow's hierarchy of needs

Reduced to near-starvation by their rulers, inhabitants of Suzanne Collins' fictional nation, Panem, hunger for food and survival. *Hunger Games* heroine Katniss Everdeen expresses higher-level needs for actualization and transcendence, and in the process inspires the nation.

Near the end of his life, Maslow proposed that some people also reach a level of *self-transcendence.* At the self-actualization level, people seek to realize their own potential. At the self-transcendence level, people strive for meaning, purpose, and communion in a way that is transpersonal—beyond the self (Koltko-Rivera, 2006). Maslow's contemporary, psychiatrist Viktor Frankl (1962), a Nazi concentration camp survivor, concurred that the search for meaning is an important human motive: "Life is never made unbearable by circumstances, but only by lack of meaning and purpose."

"Do you feel your life has an important purpose or meaning?" When Gallup asked that of people in 132 countries, 91 percent answered *Yes* (Oishi & Diener, 2014). Today's psychological scientists report that people sense meaning when they experience their life as having *purpose* (goals), *significance* (value), and *coherence* (making sense)—sentiments nourished by strong social connections, a religious faith, an orderly world, and social status (King et al., 2016; Martela & Steger, 2016). Moreover, meaning matters: People's sense of life's meaning predicts their psychological and physical well-being, and their capacity to cope with adversity (Heine et al., 2006).

The order of Maslow's hierarchy is not universally fixed. People have starved themselves, for example, to make a political statement. Culture also influences our priorities: Self-esteem matters most in individualist nations, whose citizens tend to focus more on personal achievements than on family and community identity (Oishi et al., 1999). And, while agreeing with Maslow's basic levels of need, today's psychologists note that gaining and retaining mates, parenting offspring, and desiring social status are also universal human motives (Anderson et al., 2015; Kenrick et al., 2010).

Nevertheless, the simple idea that some motives are more compelling than others provides a framework for thinking about motivation. Worldwide life-satisfaction surveys support this basic idea (Oishi et al., 1999; Tay & Diener, 2011). In poorer nations that lack easy access to money and the food and shelter it buys, financial satisfaction more strongly predicts feelings of well-being. In wealthy nations, where most are able to meet their basic needs, social connections better predict well-being.

The New Yorker Collection, 2000, Bob Zahn from cartoonbank.com. All Rights Reserved.

"What do you think . . . should we get started on that motivation research or not?"

With these classic motivation theories in mind (see **Table 37.1**), let's now consider four representative motives, beginning at the physiological level with hunger and working up through sexual motivation to the higher-level needs to belong and to achieve. At each level, we shall see how experience interacts with biology.

TABLE 37.1 Classic Motivation Theories

Theory	Its Big Idea
Instinct theory	There is a genetic basis for unlearned, species-typical behavior (such as birds building nests or infants rooting for a nipple).
Drive-reduction theory	A physiological need (such as for food and water) creates an aroused psychological drive (hunger or thirst) that motivates a drive-reducing behavior (eating and drinking).
Arousal theory	Our need to maintain an optimal level of arousal motivates behaviors that meet no physiological need (such as our yearning for stimulation and our hunger for information).
Maslow's hierarchy of needs	We prioritize survival-based needs and then social needs more than the needs for esteem and meaning.

✓ Check Your Understanding

Ask Yourself

- Consider your own experiences in relation to Maslow's hierarchy of needs. Have you ever experienced hunger or thirst that displaced your concern for other, higher-level needs? Do you usually feel safe? Loved? Confident? How often do you feel you are able to address what Maslow called your "self-actualization" needs?

Test Yourself

- An older friend recounted his weekend experience. After hours of driving to visit a friend, he could not find anywhere to stop. Finally, he spotted a dimly lit diner. Although it looked deserted and a little creepy, he went in anyway because he was *really* hungry and thirsty. How would Maslow's hierarchy of needs explain his behavior?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 37 REVIEW

37-1 How do psychologists define *motivation*? From what perspectives do they view motivated behavior?

- *Motivation* is a need or desire that energizes and directs behavior.
- The *instinct* theory explores genetic influences on complex behaviors.
- *Drive-reduction theory* explores how *physiological needs* create aroused tension states (drives) that direct us to satisfy those needs. Environmental *incentives* can intensify drives, and we can be motivated *intrinsically* or *extrinsically*. Drive reduction’s goal is *homeostasis*, maintaining a steady internal state.
- Optimal arousal theory proposes that some behaviors (such as those driven by curiosity) do not reduce physiological needs but rather are prompted by a search for an optimum level of arousal. The *Yerkes-Dodson law* states that performance increases with arousal, but only to a certain point, after which it decreases. Performance peaks at lower levels of arousal for difficult tasks, and at higher levels for easy or well-learned tasks.
- Abraham Maslow’s *hierarchy of needs* proposes a pyramid of human needs, from basic needs such as hunger and thirst up to higher-level needs such as self-actualization and self-transcendence.

37-2 Why is the idea that some needs are more compelling than others a useful framework for thinking about motivation?

- Theories such as Maslow’s hierarchy of needs address the fact that some needs take priority. Although the order of this hierarchy is not universally fixed (as seen when people refuse to eat to make a political statement), worldwide surveys support this basic idea.

Multiple-Choice Questions

1. Instinct theory is related to the _____ perspective of psychology.

a. motivational
b. evolutionary
c. arousal
d. drive-reduction
e. self-actualization

2. Karl is hungry, so he eats a hamburger and does not feel hungry anymore. Karl's hunger can best be described as a(n)

a. drive.
b. instinct.
c. incentive.
d. reflex.
e. extrinsic reward.

3. Which of the following is a conclusion that can be drawn from the Yerkes-Dodson law?

a. Performance on easy tasks is best when arousal is low.
b. Performance is best when arousal is extremely high.
c. Performance is best when arousal is extremely low.
d. Performance on difficult tasks is best when arousal is high.
e. Performance is best when arousal is moderate.

4. Which of the following is the most basic motive in Maslow's hierarchy of needs?

a. Belongingness and love needs
b. Physiological needs
c. Esteem needs
d. Self-actualization needs
e. Self-transcendence needs

5. Maslow's hierarchy of needs would have difficulty explaining why

a. a person in a war zone is not interested in being self-actualized.
b. a lonely person does not look beyond themselves to find their identity.

c. a hungry person works hard to feed herself.
d. a prisoner engages in a hunger strike to improve their cell conditions.
e. a teenager with many friends works to earn the respect of his elders.

Practice FRQs

1. How can you use Maslow’s hierarchy of needs to explain why

- a hungry young person would steal?
- a lonely new student in a school would join a club?
- a successful artist would continue to invest tremendous effort in her career?

Answer

1 point: A hungry young person would steal because of a physiological need. Page 405

1 point: A lonely new student would join a club to meet belongingness and love needs. Page 405

1 point: A successful artist would still work hard to satisfy the need for self-actualization. Page 405

2. Describe how the following motivational theories could explain a young man’s desire to become an excellent soccer player:

- Incentive
- Arousal
- Maslow’s hierarchy of needs

(3 points)

Module 38 Hunger Motivation

LEARNING TARGETS

- **38-1 Describe the physiological factors that produce hunger.**
- **38-2 Discuss cultural and situational factors that influence hunger.**
- **38-3 Discuss how we are affected by obesity and the factors involved in weight management.**

As dieters know, physiological needs are powerful. This was vividly demonstrated when Ancel Keys and his research team (1950) studied semistarvation among wartime volunteers who participated in a challenging experiment as an alternative to military service. After feeding 200 men normally for three months, researchers halved the food intake for 36 of them. These semistarved men became listless and apathetic as their bodies conserved energy. Eventually, their body weights stabilized about 25 percent below their starting weights.

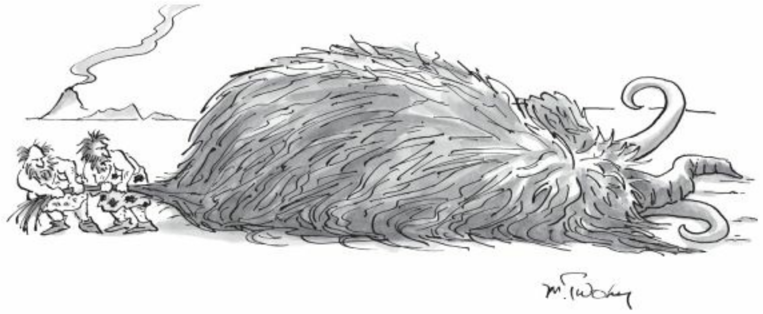
More dramatic were the psychological effects. Consistent with Maslow’s idea of a needs hierarchy, the men became food obsessed. They talked food. They daydreamed food. They collected recipes, read cookbooks, and feasted their eyes on delectable forbidden foods. Preoccupied with their unfulfilled basic need, they lost interest in sex and social activities. As one participant reported, “If we see a show, the most interesting part of it is contained in scenes where people are eating. I couldn’t laugh at the funniest picture in the world, and love scenes are completely dull.” The men’s preoccupations illustrate how powerful motives can hijack our consciousness. As journalist Dorothy Dix (1861–1951) observed, “Nobody wants to kiss when they are hungry.”

Pictures/REX/Shutterstock

Hunger hijacks the mind World War II survivor Louis Zamperini (protagonist of the book and movie *Unbroken*, shown here) went down with his plane over the Pacific Ocean. He and two other crew members drifted for 47 days, subsisting on an occasional bird or a fish. To help pass time, the hunger-driven men recited recipes or recalled their mothers’ home cooking.

> “*Hunger is the most urgent form of poverty.*”
>
> *Alliance to End Hunger, 2002*

When you are hungry, thirsty, fatigued, or sexually aroused, little else may seem to matter. In University of Amsterdam studies, Loran Nordgren and his colleagues (2006, 2007) found that people in a motivational “hot” state (from fatigue, hunger, or sexual arousal) easily recalled such feelings in their own past and perceived them as driving forces in others’ behavior. (You may recall from Module 32 a parallel effect of our current good or bad mood on our memories of good or bad moods.) In another experiment, people were given money to bid for foods. When hungry, people *over*bid for snacks they were told they could eat later when they would be full. When full, people *under*bid for snacks they were told they could eat later when they would be hungry (Fisher & Rangel, 2014). It’s hard to imagine what we’re not feeling! Likewise, when sexually motivated, men more often perceive a smile as flirtation rather than simple friendliness (Howell et al., 2012). Grocery shop with an empty stomach and you are more likely to see those jelly-filled doughnuts as just what you’ve always loved and will be wanting tomorrow. *Motives matter mightily*.



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“Never hunt when you’re hungry.”

“*The full person does not understand the needs of the hungry.*”

Irish proverb

The Physiology of Hunger

38-1 What physiological factors produce hunger?

Keys' semistarved volunteers felt their hunger because of a homeostatic system that maintains one's normal body weight and an adequate nutrient supply. But what precisely triggers hunger? Is it the pangs of an empty stomach? So it seemed to A. L. Washburn. Working with Walter Cannon, Washburn agreed to swallow a balloon attached to a recording device (Cannon & Washburn, 1912) (**Figure 38.1**). When inflated to fill his stomach, the balloon transmitted his stomach contractions. Washburn supplied information about his *feelings* of hunger by pressing a key each time he felt a hunger pang. The discovery: Whenever Washburn felt hungry, he was indeed having stomach contractions.

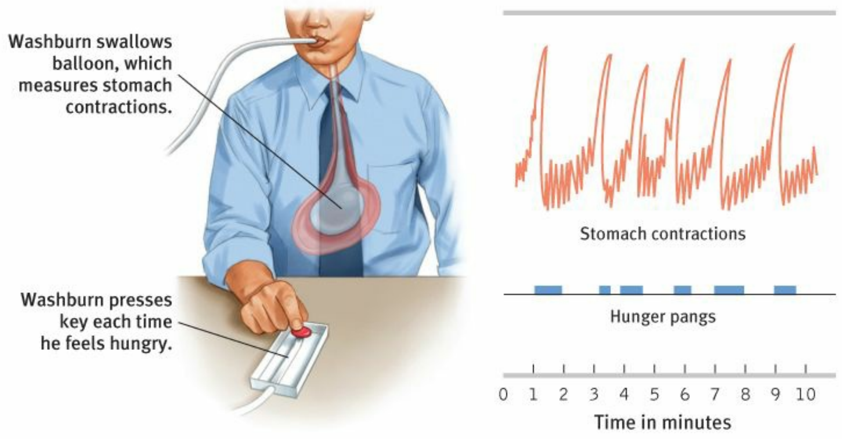
Washburn swallows balloon, which measures stomach contractions.
Washburn presses key each time he feels hungry.
Stomach contractions
Hunger pangs
0 1 2 3 4 5 6 7 8 9 10
Time in minutes

Figure 38.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Information from Cannon, 1929.

Figure 38.1 Monitoring stomach contractions

(Information from Cannon, 1929.)

Can hunger exist without stomach pangs? To answer that question, researchers removed some rats' stomachs, creating a direct path to their small intestines (Tsang, 1938). Did the rats continue to eat? Indeed they did. Some hunger similarly persists in humans whose ulcerated or cancerous stomachs have been removed.

If the pangs of an empty stomach are not the only source of hunger, what else matters?

Body Chemistry and the Brain

People and other animals automatically regulate their caloric intake to prevent energy deficits and maintain a stable body weight. This suggests that somehow, somewhere, the body is keeping tabs on its available resources. One such resource is the blood sugar **glucose**. Increases in the hormone *insulin* (secreted by the pancreas) diminish blood glucose, partly by converting it to stored fat. If your blood glucose level drops, you won't consciously feel the lower blood sugar. But your brain, which is automatically monitoring your blood chemistry and your body's internal state, will trigger hunger. Signals from your stomach, intestines, and liver (indicating whether glucose is being deposited or withdrawn) all signal your brain to motivate eating or not.

glucose

the form of sugar that circulates in the blood and provides the major source of energy for body tissues. When its level is low, we feel hunger.

How does the brain integrate these messages and sound the alarm? The work is done by several neural areas, some housed deep in the brain within the hypothalamus, a neural traffic intersection (**Figure 38.2**). For example, one neural network (called the *arcuate nucleus*) has a center that secretes appetite-stimulating hormones. When stimulated electrically, well-fed animals begin to eat. If the area is destroyed, even starving animals have no interest in food. Another neural center secretes appetite-suppressing hormones. When electrically stimulated, animals will stop eating. Destroy this area and animals can't stop eating and will become obese (Duggan & Booth, 1986; Hoebel & Teitelbaum, 1966).

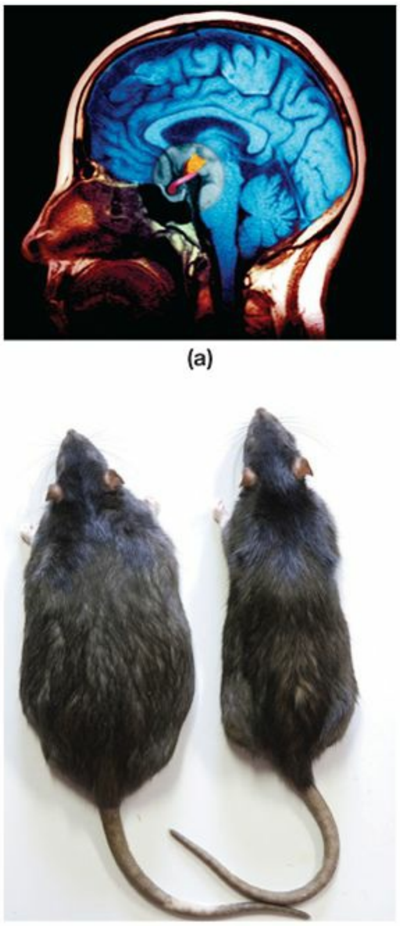

Figure 38.2
(a) ISM/Sovereign/Medical Images USA;
(b) Voisin/Phanie/Science Source

Figure 38.2 The hypothalamus

(a) The hypothalamus (colored orange) performs various body maintenance functions, including control of hunger. Blood vessels supply the hypothalamus, enabling it to respond to our current blood chemistry as well as to incoming neural information about the body's state. (b) The fat mouse on the left has nonfunctioning receptors in the appetite-suppressing part of the hypothalamus.

Blood vessels connect the hypothalamus to the rest of the body, so it can respond to our current blood chemistry and other incoming information. One of its tasks is monitoring levels of appetite hormones, such as *ghrelin*, a hunger-arousing hormone secreted by an empty stomach. During bypass surgery for severe obesity, surgeons seal off or remove part of the stomach. The remaining stomach then produces much less ghrelin, and the person's appetite lessens (Ammori, 2013; Lemonick, 2002). Besides insulin and ghrelin, other appetite hormones include *leptin*, *orexin*, and *PYY;* **Figure 38.3** describes how they influence our feelings of hunger.

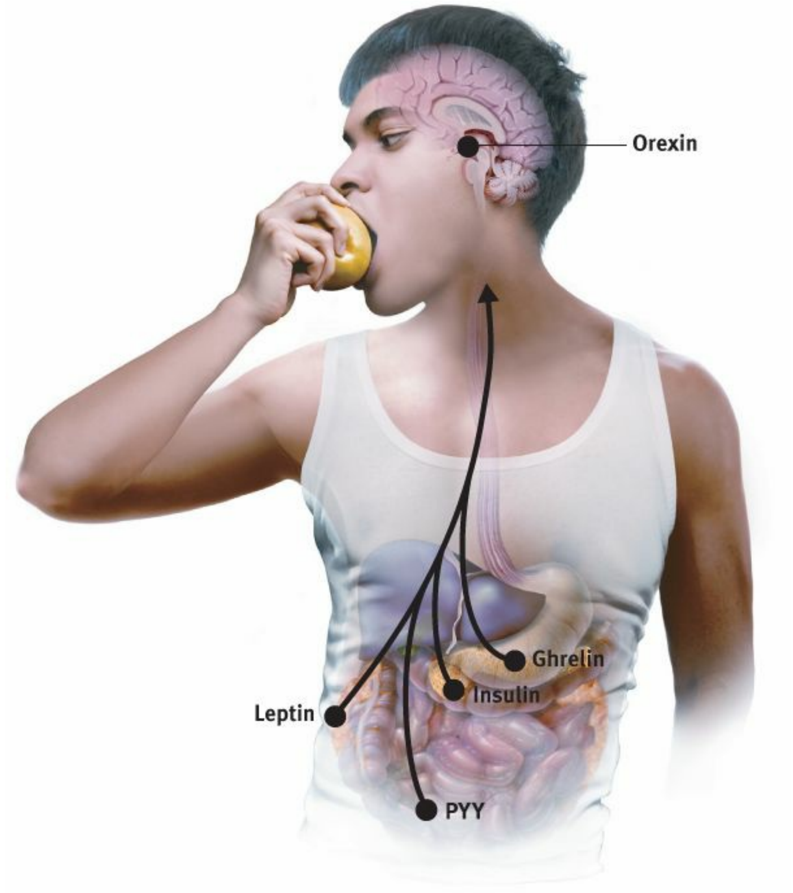

Figure 38.3
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Figure 38.3 The appetite hormones

Increases appetite:

- *Ghrelin:* Hormone secreted by empty stomach; sends "I'm hungry" signals to the brain.
- *Orexin:* Hunger-triggering hormone secreted by hypothalamus.

Decreases appetite:

- *Insulin:* Hormone secreted by pancreas; controls blood glucose.
- *Leptin:* Protein hormone secreted by fat cells; when abundant, causes brain to increase metabolism and decrease hunger.
- *PYY:* Digestive tract hormone; sends "I'm *not* hungry" signals to the brain.

▶ **Flip It Video: Hormones of Hunger**

Experimental manipulation of appetite hormones has raised hopes for an appetite-reducing medication. Such a nose spray or skin patch might counteract the body’s hunger-producing chemicals or mimic (or even increase) the levels of hunger-dampening chemicals.

You can also blame your brain for weight regain (Cornier, 2011). The complex interaction of appetite hormones and brain activity helps explain the body’s predisposition to maintain a particular weight. When semistarved rats fall below their normal weight, their “weight thermostat” signals the body to restore the lost weight. It’s as though fat cells cry out “Feed me!” and grab glucose from the bloodstream (Ludwig & Friedman, 2014). Hunger increases and energy expenditure decreases. This stable weight toward which semistarved rats return is their **set point** (Keesey & Corbett, 1984). In rats and humans, heredity influences body type and approximate set point.

set point

the point at which your “weight thermostat” may be set. When your body falls below this weight, increased hunger and a lowered metabolic rate may combine to restore lost weight.

Our bodies regulate weight through the control of food intake, energy output, and **basal metabolic rate**—the resting rate of energy expenditure for maintaining basic body functions. By the end of their 6 months of semistarvation, the men who participated in Keys’ experiment had stabilized at three-quarters of their normal weight, although they were taking in *half* of their previous calories. How did they achieve this dieter’s nightmare? They reduced their energy expenditure, partly through inactivity but partly because of a 29 percent drop in their basal metabolic rate.

basal metabolic rate

the body’s resting rate of energy output.

Some researchers, however, doubt that our bodies have a preset tendency to maintain optimum weight (Assanand et al., 1998). They point out that slow, sustained changes in body weight can alter one’s set point, and that psychological factors also sometimes drive our feelings of hunger. Given unlimited access to a wide variety of tasty foods, people and other animals tend to overeat and gain weight (Raynor & Epstein, 2001). For these reasons, some researchers prefer the term *settling point* to indicate the level at which a person’s weight settles in response to caloric intake and expenditure (which are influenced by environment as well as biology).

✓ Check Your Understanding

Ask Yourself

- Have you ever dieted or fasted and experienced the kind of food-distracted thoughts Ancel Keys’ volunteers experienced? How did that affect your behavior?

Test Yourself

- Hunger occurs in response to ______________ (low/high) blood glucose and ______________ (low/high) levels of ghrelin.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

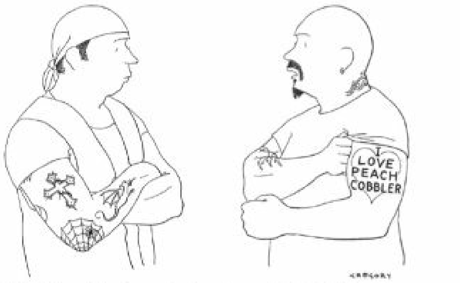
The Psychology of Hunger

38-2 What cultural and situational factors influence hunger?

Our internal hunger is pushed by our physiology—our body chemistry and hypothalamic activity. Yet there is more to hunger than meets the stomach. This was strikingly apparent when clever researchers (Rozin et al., 1998) tested two patients with amnesia who had no memory for events occurring more than a minute ago. If, 20 minutes after eating a normal lunch, the patients were offered another, both readily consumed it . . . and usually a third meal offered 20 minutes after the second was finished. This suggests that part of knowing when to eat is our memory of our last meal. As time passes since we last ate, we anticipate eating again and start feeling hungry.

Taste Preferences: Biology and Culture

Body cues and environmental factors together influence not only the *when* of hunger, but also the *what*—our taste preferences. When feeling tense or depressed, do you tend to take solace in high-calorie foods, as ardent football fans have done after a big loss (Cornil & Chandon, 2013)? Carbohydrates boost the neurotransmitter serotonin, which has calming effects. When stressed, both rats and many humans find it extra rewarding to scarf chocolate cookies (Artiga et al., 2007; Sproesser et al., 2014).



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"Never get a tattoo when you're drunk and hungry."

Left: RICHARD OLSENIUS/National Geographic Creative; Right: Mark Bowler/Alamy

An acquired taste People everywhere learn to enjoy the fatty, bitter, or spicy foods common in their culture. For these Alaska Natives (left), but not for most other North Americans, whale blubber is a tasty treat. For Peruvians (right), roasted guinea pig is similarly delicious.

Our preferences for sweet and salty tastes are genetic and universal. Other taste preferences are conditioned, as when people given highly salted foods develop a liking for excess salt (Beauchamp, 1987), or when people who have been sickened by a food develop an aversion to it. (The frequency of children's illnesses provides many chances for them to learn food aversions.)

Culture affects taste, too. Many Japanese people enjoy *nattó*, a fermented soybean dish, which smell expert Rachel Herz (2012) reports "smells like the marriage of ammonia and a tire fire." Asians, she adds, are often repulsed by what many Westerners love—"the rotted bodily fluid of an ungulate" (a.k.a. cheese, some varieties of which have the same bacteria and odor as stinky feet).

Rats tend to avoid unfamiliar foods (Sclafani, 1995). So do we, especially animal-based foods. Such *neophobia* (dislike of unfamiliar things) surely was adaptive for our ancestors, protecting them from potentially toxic substances. Disgust works. We can overcome food dislikes by repeatedly trying small samples of an unfamiliar food or drink. In experiments, this tends to increase people's appreciation for the new taste. Moreover, exposure to one set of novel foods increases our willingness to try another (Pliner, 1982; Pliner et al., 1993).

Other taste preferences also are adaptive. For example, the spices most commonly used in hot-climate recipes—where food, especially meat, is at risk of spoiling more quickly—inhibit bacteria growth (**Figure 38.4**). Pregnancy-related nausea and food aversions peak about the tenth week, when the developing embryo is most vulnerable to toxins. So there is biological wisdom to our taste preferences.

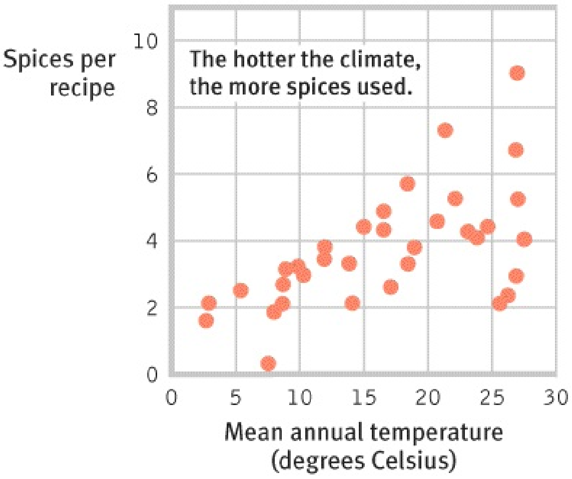

Figure 38.4
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Figure 38.4 Hot cultures like hot spices

Countries with hot climates, in which food historically spoiled more quickly, feature recipes with more bacteria-inhibiting spices (Sherman & Flaxman, 2001). India averages nearly 10 spices per meat recipe; Finland, 2 spices.

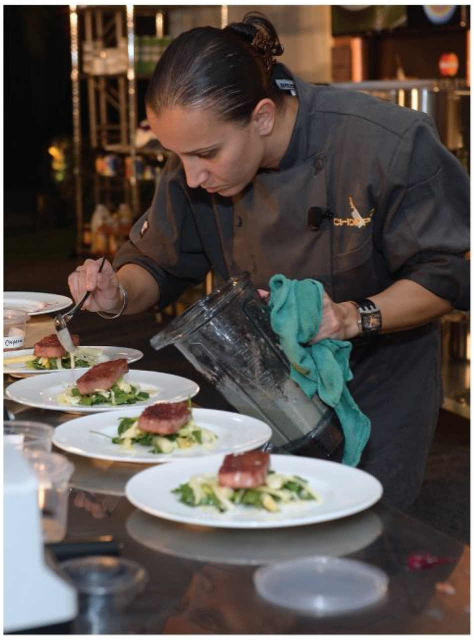
Situational Influences on Eating

To a surprising extent, situations also control our eating—a phenomenon psychologists have called the *ecology of eating*. Here are five situational influences you may have noticed but underestimated:

- **AROUSING APPETITE.** In one experiment, watching an intense action movie (rather than a nonarousing interview) doubled snacking (Tal et al., 2014).
- **FRIENDS AND FOOD.** Do you eat more when eating with others? Most of us do (Herman et al., 2003; Hetherington et al., 2006). After a party, you may realize you've overeaten. This happens because the presence of others tends to amplify our natural behavior tendencies. (More about

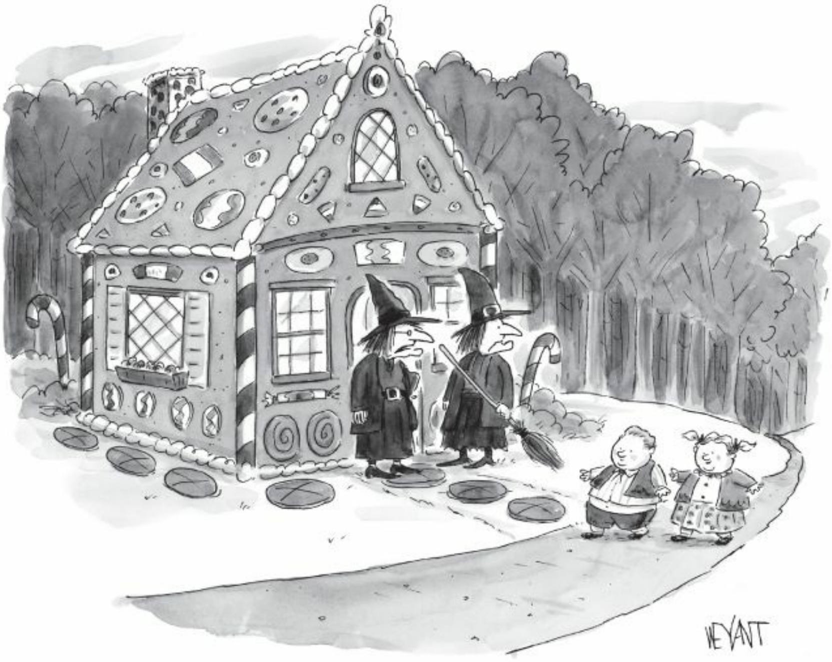
this *social facilitation* in Module 76.)

- **SERVING SIZE IS SIGNIFICANT.** Researchers studied the effects of portion size by offering people varieties of free snacks (Geier et al., 2006). For example, in an apartment building's lobby, they laid out either full or half pretzels, big or little Tootsie Rolls, or a small or large serving scoop by a bowl of M&M'S. Their consistent result: Offered a supersized portion, people put away more calories. Offered pasta, people eat more when given a bigger plate (Van Ittersum & Wansink, 2012). Larger portions induce bigger bites, which may increase intake by decreasing oral exposure time (Herman et al., 2015). Children also eat more when using adult-sized (rather than child-sized) dishware (DiSantis et al., 2013). Even nutrition experts helped themselves to 31 percent more ice cream when given a big bowl rather than a small one (Wansink, 2014; Wansink et al., 2006). Portion size matters.
- **SELECTIONS STIMULATE.** Food variety also stimulates eating. Offered a dessert buffet, people eat more than they do when choosing a portion from one favorite dessert. For our early ancestors, variety was healthy. When foods were abundant and varied, eating more provided a wide range of vitamins and minerals and produced protective fat for winter cold or famine. When a bounty of varied foods was unavailable, eating less extended the food supply until winter or famine ended (Polivy et al., 2008; Remick et al., 2009).
- **NUDGING NUTRITION.** One research team quadrupled carrots taken by offering schoolchildren carrots before they picked up other foods in a lunch line (Redden et al., 2015). A new school lunch tray puts fruits and veggies up front, and spreads the main dish out in a shallow compartment to make it look bigger (Wansink, 2014). Such "nudges" supported Barack Obama's 2015 executive order to use "behavioral science insights to better serve the American people."



Gustavo Caballero/Getty Images

Cooking shows increase appetites but not healthful home cooking
Julia Child was once the only chef on TV. Today dozens of cooking shows are broadcast to millions of U.S. viewers daily. Yet fewer Americans than ever are home cooking their own, more healthful meals (Pollan, 2009). Nations that devote more time to food preparation at home tend to have lower rates of obesity (Cutler et al., 2003).



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“Remember when we used to have to fatten the kids up first?”

“ *We put fast food on every corner, we put junk food in our schools, we got rid of* *[physical education classes], we put candy and soda at the checkout stand of every retail outlet you can think of. The results are in. It worked.*”

Harold Goldstein, Executive Director of the California Center for Public Health Advocacy, 2009, when imagining a vast U.S. national experiment to encourage weight gain

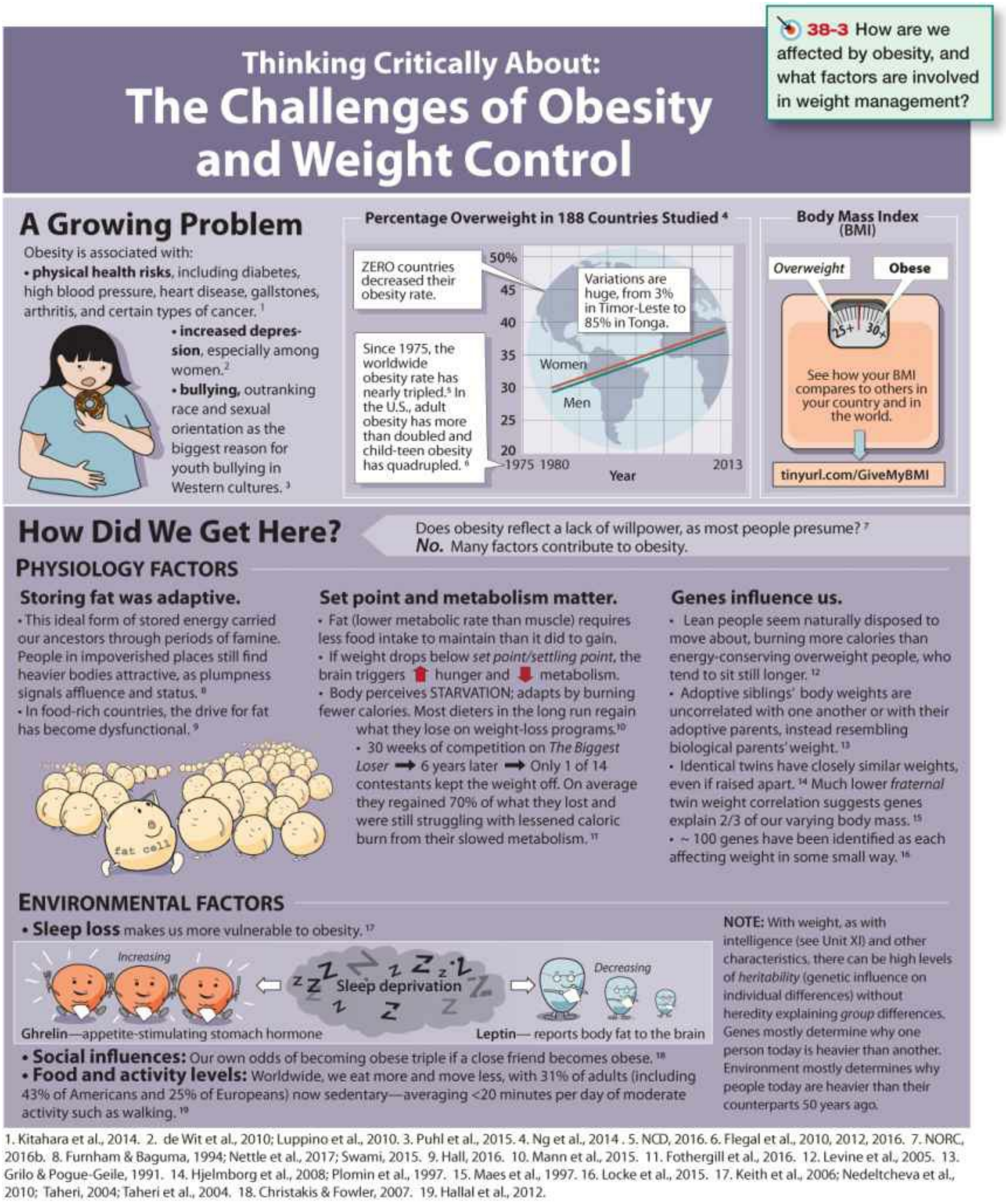
* * *

To consider how hunger and other factors affect our weight, see Thinking Critically About: The Challenges of Obesity and Weight Control. And for tips on shedding unwanted weight see **Table 38.1**.

TABLE 38.1 Waist Management

People struggling with obesity should seek medical evaluation and guidance. For others who wish to lose weight, researchers have offered these tips:
• ***Begin only if you feel motivated and self-disciplined.*** Permanent weight loss usually requires a lifelong change in eating habits combined with increased exercise.
• ***Exercise and get enough sleep.*** Especially when supported by 7 to 8 hours of sleep a night, exercise empties fat cells, builds muscle, speeds up metabolism, helps lower your settling point, and reduces stress and stress-induced craving for carbohydrate-rich comfort foods (Bennett, 1995; Ruotsalainen et al., 2015; Thompson et al., 1982).
• ***Minimize exposure to tempting food cues.*** Food shop on a full stomach. Keep tempting foods out of the house, and tuck away special-occasion foods.
• ***Limit variety and eat healthy foods.*** Given more variety, people consume more. So eat simple meals with vegetables, fruits, and whole grains. Healthy fats, such as those found in olive oil and fish, help regulate appetite (Taubes, 2001, 2002). Water- and vitamin-rich veggies can fill the stomach with few calories. Better crispy greens than Krispy Kremes.
• ***Reduce portion sizes.*** Serve food with smaller bowls, plates, and utensils.
• ***Don’t starve all day and eat one big meal at night.*** This common eating pattern slows metabolism. Moreover, those who eat a balanced breakfast are, by late morning, more alert and less fatigued (Spring et al., 1992).
• ***Beware of the binge.*** The urge to eat can be unleashed in adults who drink alcohol or start feeling anxious or depressed (Herman & Polivy, 1980). And men especially should note that eating slowly can lead to eating less (Martin et al., 2007).
• ***Before eating with others, decide how much you want to eat.*** Eating with friends can

distract us from monitoring our own eating (Ward & Mann, 2000).
• ***Remember, most people occasionally lapse.*** A lapse need not become a collapse.
• ***Chart your progress online.*** Those who record and publicly disclose their progress toward a goal more often achieve it (Harkin et al. 2016).
• ***Connect to a support group.*** Join with others, either face-to-face or online, to share goals and progress updates (Freedman, 2011).



38-3 How are we affected by obesity, and what factors are involved in weight management?

Thinking Critically About:

The Challenges of Obesity and Weight Control

A Growing Problem

Obesity is associated with:

- **physical health risks**, including diabetes, high blood pressure, heart disease, gallstones, arthritis, and certain types of cancer.[1]
- **increased depression**, especially among women.[2]
- **bullying**, outranking race and sexual orientation as the biggest reason for youth bullying in Western cultures.[3]

Percentage Overweight in 188 Countries Studied[4]

ZERO countries decreased their obesity rate.

Variations are huge, from 3% in Timor-Leste to 85% in Tonga.

Since 1975, the worldwide obesity rate has nearly tripled.[5] In the U.S., adult obesity has more than doubled and child-teen obesity has quadrupled.[6]

Body Mass Index (BMI)

See how your BMI compares to others in your country and in the world.

tinyurl.com/GiveMyBMI

How Did We Get Here?

Does obesity reflect a lack of willpower, as most people presume?[7] ***No.*** Many factors contribute to obesity.

PHYSIOLOGY FACTORS

Storing fat was adaptive.

- This ideal form of stored energy carried our ancestors through periods of famine. People in impoverished places still find heavier bodies attractive, as plumpness signals affluence and status.[8]
- In food-rich countries, the drive for fat has become dysfunctional.[9]

Set point and metabolism matter.

- Fat (lower metabolic rate than muscle) requires less food intake to maintain than it did to gain.
- If weight drops below *set point/settling point*, the brain triggers ⬆ hunger and ⬇ metabolism.
- Body perceives STARVATION; adapts by burning fewer calories. Most dieters in the long run regain what they lose on weight-loss programs.[10]
- 30 weeks of competition on *The Biggest Loser* ➡ 6 years later ➡ Only 1 of 14 contestants kept the weight off. On average they regained 70% of what they lost and were still struggling with lessened caloric burn from their slowed metabolism.[11]

Genes influence us.

- Lean people seem naturally disposed to move about, burning more calories than energy-conserving overweight people, who tend to sit still longer.[12]
- Adoptive siblings' body weights are uncorrelated with one another or with their adoptive parents, instead resembling biological parents' weight.[13]
- Identical twins have closely similar weights, even if raised apart.[14] Much lower *fraternal* twin weight correlation suggests genes explain 2/3 of our varying body mass.[15]
- ~ 100 genes have been identified as each affecting weight in some small way.[16]

ENVIRONMENTAL FACTORS

- **Sleep loss** makes us more vulnerable to obesity.[17]

Increasing
Sleep deprivation
Decreasing
Ghrelin—appetite-stimulating stomach hormone
Leptin— reports body fat to the brain

- **Social influences:** Our own odds of becoming obese triple if a close friend becomes obese.[18]
- **Food and activity levels:** Worldwide, we eat more and move less, with 31% of adults (including 43% of Americans and 25% of Europeans) now sedentary—averaging <20 minutes per day of moderate activity such as walking.[19]

NOTE: With weight, as with intelligence (see Unit XI) and other characteristics, there can be high levels of *heritability* (genetic influence on individual differences) without heredity explaining *group* differences. Genes mostly determine why one person today is heavier than another. Environment mostly determines why people today are heavier than their counterparts 50 years ago.

1. Kitahara et al., 2014. 2. de Wit et al., 2010; Luppino et al., 2010. 3. Puhl et al., 2015. 4. Ng et al., 2014 . 5. NCD, 2016. 6. Flegal et al., 2010, 2012, 2016. 7. NORC, 2016b. 8. Furnham & Baguma, 1994; Nettle et al., 2017; Swami, 2015. 9. Hall, 2016. 10. Mann et al., 2015. 11. Fothergill et al., 2016. 12. Levine et al., 2005. 13. Grilo & Pogue-Geile, 1991. 14. Hjelmborg et al., 2008; Plomin et al., 1997. 15. Maes et al., 1997. 16. Locke et al., 2015. 17. Keith et al., 2006; Nedeltcheva et al., 2010; Taheri, 2004; Taheri et al., 2004. 18. Christakis & Fowler, 2007. 19. Hallal et al., 2012.

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obesity

defined as a body mass index (BMI) measurement of 30 or higher. (Overweight individuals have a BMI of 25 or higher.)

✓ Check Your Understanding

Ask Yourself

- Do you feel in touch with your body’s hunger signals? Do you eat when your body needs food? Or do you tend to be more externally influenced by enticing foods even when you’re full?

Test Yourself

- Why can two people of the same height, age, and activity level maintain the same weight, even if one of them eats much less than the other does?
- You skipped lunch to meet with your guidance counselor, so you haven’t eaten anything in eight hours. As your long-awaited favorite dish is placed in front of you, your mouth waters in anticipation. Why?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 38 REVIEW

38-1 What physiological factors produce hunger?

- Hunger's pangs correspond to the stomach's contractions, but hunger also has other causes.
- Neural areas in the brain, some within the hypothalamus, monitor blood chemistry (including *glucose* level) and incoming information about the body's state.
- Appetite hormones include insulin (controls blood glucose), ghrelin (secreted by an empty stomach), leptin (secreted by fat cells), orexin (secreted by the hypothalamus), and PYY (secreted by the digestive tract).
- *Basal metabolic rate* is the body's resting rate of energy expenditure.
- The body may have a *set point* (a biologically fixed tendency to maintain an optimum weight) or a looser settling point (also influenced by the environment).

38-2 What cultural and situational factors influence hunger?

- Hunger also reflects our memory of when we last ate and our expectation of when we should eat again.
- Humans as a species prefer certain tastes (such as sweet and salty), but our individual preferences are also influenced by conditioning, culture, and situation.
- Some taste preferences, such as the avoidance of new foods or of foods that have made us ill, have survival value.

38-3 How are we affected by obesity, and what factors are involved in weight management?

- Obesity, defined by a body mass index (BMI) of 30 or above, is associated with increased depression (especially among women), bullying, and some physical health risks.

- Physiological factors and environmental factors interact to produce obesity.
  - Storing fat was adaptive to our ancestors, and fat requires less food intake to maintain than it did to gain. Set point and metabolism matter; lean people tend to move around more. Twin and adoption studies indicate that body weight is also genetically influenced.
  - Environmental influences include sleep loss, social influence, and food and activity levels.
- Those wishing to lose weight are advised to make a lifelong change in habits: Begin only if you feel motivated and self-disciplined, exercise and get enough sleep, minimize exposure to tempting food cues, limit variety and eat healthy foods, reduce portion sizes, space meals throughout the day, beware of the binge, plan eating to help monitor yourself during social events, forgive the occasional lapse, and connect to a support group.

Multiple-Choice Questions

1. At the end of your summer barbeque, you are feeling very full due to the activity of your

a. cerebellum.
b. arcuate nucleus.
c. hypothalamus.
d. hippocampus.
e. adrenal glands.

2. No matter how hard she tries to lose weight, Anne finds it difficult to drop below 145 pounds. The weight of 145 pounds is best described as Anne’s

a. neophobia.
b. basal metabolic rate.

c. body mass index.
d. PYY.
e. set point.

3. Leptin, a protein that causes hunger when its levels are low, is secreted by

a. fat cells.
b. the pituitary gland.
c. the stomach.
d. the small intestine.
e. the large intestine.

4. Dylan has a BMI of 36. She would best be described as

a. introverted.
b. below average on the Buoyant Mood Index.
c. normal in Basal Metabolism Index score.
d. extroverted.
e. obese.

Practice FRQs

1. Stefani is hungry, so she visits the cafeteria and eats a satisfying meal. After lunch, she returns to class and is no longer hungry. Explain the role of the following in Stefani's hunger or subsequent lack of hunger:

- Hypothalamus
- Glucose
- Leptin

Answer

1 point: The hypothalamus will trigger Stefani's feelings of hunger. Page 410

1 point: Stefani's glucose levels are low, which causes her to feel hungry. After she eats, the levels return to normal and she no longer feels hungry. Page 409

1 point: If Stefani’s leptin levels are elevated then she will not feel hunger; when the levels are low she will feel hunger. Page 410

2. George believes he is overweight and would like to lose weight. Explain why each of the following would help or hinder his efforts to lose weight:

- Eating while watching an action movie
- Eating with his friends
- Eating in a buffet restaurant

(3 points)

Module 39 Sexual Motivation

LEARNING TARGETS

- 39-1 Explain how hormones influence human sexual motivation.
- 39-2 Describe the human *sexual response cycle*.
- 39-3 Discuss how external and imagined stimuli contribute to sexual arousal.

Sex is a part of life. For all but the tiny fraction of us considered **asexual**, dating and mating become a high priority from puberty on. Physiological and psychological influences affect our sexual feelings and behaviors.

asexual

having no sexual attraction to others.

The Physiology of Sex

Sex is not like hunger, because it is not an actual *need.* Yet sex motivates. Had this not been so for all your ancestors, you would not be alive and reading these words. Sexual motivation is nature's clever way of making people procreate, thus enabling our species' survival. Life is sexually transmitted.

Hormones and Sexual Behavior

39-1 How do hormones influence human sexual motivation?

Among the forces driving sexual behavior are the *sex hormones.* The main male sex hormone is **testosterone**. The main female sex hormones are the **estrogens**, such as *estradiol.* Sex hormones influence us at many points in the life span:

- During the prenatal period, they direct our development as males or females.
- During puberty, a sex hormone surge ushers us into adolescence.
- After puberty and well into the late adult years, sex hormones facilitate sexual behavior.

testosterone

the most important male sex hormone. Both males and females have it, but the additional testosterone in males stimulates the growth of the male sex organs during the fetal period and the development of the male sex characteristics during puberty.

estrogens

sex hormones, such as estradiol, that contribute to female sex characteristics and are secreted in greater amounts by females than by males. Estrogen levels peak during ovulation. In nonhuman mammals, this promotes sexual receptivity.

> “*Nature often equips life’s essentials—sex, eating, nursing—with built-in gratification.*”
>
> *Frans de Waal, “Morals Without God?,” 2010*

In most mammals, nature neatly synchronizes sex with fertility. Females become sexually receptive when their estrogens peak at ovulation, and researchers can cause female animals to become receptive by injecting them with estrogens. Male hormone levels are more constant, and hormone injection does not so easily affect the sexual behavior of male animals (Piekarski et al., 2009). Nevertheless, male hamsters that have had their testosterone-making testes surgically removed will gradually lose much of their interest in receptive females. They gradually regain it if injected with testosterone.

Hormones do influence human sexual behavior, but more loosely. Researchers are exploring and debating whether women’s mate preferences change across the menstrual cycle, especially at ovulation, when both estrogens and testosterone rise (Gildersleeve et al., 2014; Haselton & Gildersleeve, 2011, 2016; Wood et al., 2014a).

Women have much less testosterone than men do. And more than other mammalian females, women are responsive to their testosterone level (Davison & Davis, 2011; van Anders, 2012). If a woman’s natural testosterone level drops, as happens with removal of the ovaries or adrenal glands, her sexual interest may wane. And as experiments with surgically or naturally menopausal women have demonstrated, testosterone-replacement therapy can often restore diminished sexual activity, arousal, and desire (Braunstein et al., 2005; Buster et al., 2005; Petersen & Hyde, 2011).

In human males with abnormally low testosterone levels, testosterone-replacement therapy often increases sexual desire and also energy and vitality (Khera et al., 2011). But normal fluctuations in testosterone levels, from man to man and hour to hour, have little effect on sexual drive (Byrne, 1982). Indeed, male hormones sometimes vary in *response* to sexual stimulation (Escasa et al., 2011). In one study, Australian skateboarders’ testosterone surged in the presence of an attractive female, contributing to riskier moves and more crash landings (Ronay & von Hippel, 2010). Thus, sexual arousal can be a *cause* as well as a consequence of increased testosterone levels.

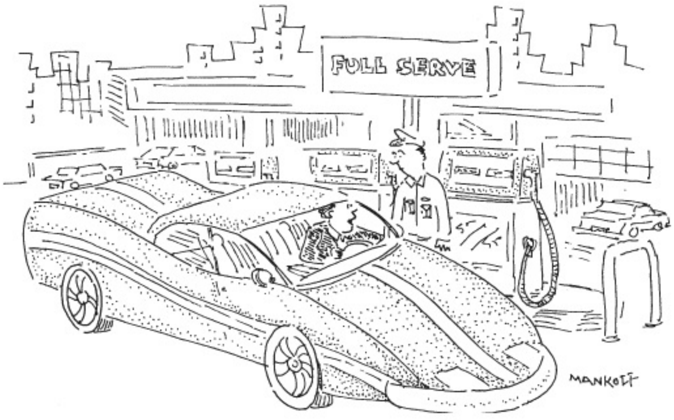
AP® EXAM TIP

The central principle here is that there are many biological processes that govern human behavior less rigidly than they govern the behaviors of other species. Because of our highly developed brain, sex hormones have less control over our behavior than they do over other animals’ behavior.

Large hormonal surges or declines affect sexual desire in shifts at two predictable points in the life span, and sometimes at an unpredictable third point:

1. *The pubertal surge in sex hormones triggers the development of sex characteristics and sexual interest.* If puberty’s hormonal surge is precluded—as it was during the 1600s and 1700s for prepubertal boys who were castrated to preserve their soprano voices for Italian opera—sex characteristics and sexual desire do not develop normally (Peschel & Peschel, 1987).
2. *In later life, sex hormone levels fall. Women experience menopause as their estrogen levels decrease; males experience a more gradual change (*Module 54*)*. Sex remains a part of life, but as hormone levels decline, sexual fantasies and intercourse decline as well (Leitenberg & Henning, 1995).
3. *For some, surgery or drugs may cause hormonal shifts.* When adult men were castrated, their sex drive typically fell as testosterone levels declined sharply (Hucker & Bain, 1990). Male sex offenders who took a drug that reduced their testosterone levels to that of a prepubertal boy

similarly lost much of their sexual urge (Bilefsky, 2009; Money et al., 1983).



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“Fill’er up with testosterone.”

To summarize: We might compare human sex hormones, especially testosterone, to the fuel in a car. Without fuel, a car will not run. But if the fuel level is minimally adequate, adding more won’t change how the car runs. The analogy is imperfect, because hormones and sexual motivation interact. However, it correctly suggests that biology is a necessary but incomplete explanation of human sexual behavior. The hormonal fuel is essential, but so are the psychological stimuli that turn on the engine, keep it running, and shift it into high gear.

The Sexual Response Cycle

39-2 What is the human *sexual response cycle*?

The scientific process often begins with simple surveys of behavior, such as Indiana University biologist Alfred Kinsey did in questioning Americans about their sexuality and writing about their experiences. And then it moves to direct observations of complex behaviors. When gynecologist-obstetrician William Masters and his collaborator Virginia Johnson (1966) applied this process to human sexual intercourse in the 1960s, they made headlines. They recorded the physiological responses of volunteers who came to their lab to masturbate or have intercourse. (The volunteers, 382 females and 312 males, were a somewhat atypical sample, consisting only of people able and willing to display arousal and orgasm while scientists observed). Their description of the **sexual response cycle** identified four stages:

1. *Excitement:* The genital areas become engorged with blood, causing a woman's clitoris and a man's penis to swell. A woman's vagina expands and secretes lubricant; her breasts and nipples may enlarge.
2. *Plateau:* Excitement peaks as breathing, pulse, and blood pressure rates continue to increase. A man's penis becomes fully engorged—to an average length of 5.6 inches among 1661 men who measured themselves for condom fitting (Herbenick et al., 2014). Some fluid—frequently containing enough live sperm to enable conception—may appear at its tip. A woman's vaginal secretion continues to increase.
3. *Orgasm:* Muscle contractions appear all over the body and are accompanied by further increases in breathing, pulse, and blood pressure rates. The pleasurable feeling of sexual release is much the same for both sexes. One panel of experts could not reliably distinguish between descriptions of orgasm written by men and those written by women (Vance & Wagner, 1976). In another study, PET scans showed that the same subcortical brain regions were active in men and women during orgasm (Holstege et al., 2003a,b).
4. *Resolution:* The body gradually returns to its unaroused state as the genital blood vessels release their accumulated blood. This happens relatively quickly if orgasm has occurred, relatively slowly otherwise. (It's like the nasal tickle that goes away rapidly if you have sneezed, slowly otherwise.) Men then enter a **refractory period** that lasts from a few minutes to a day or more, during which they are incapable of another orgasm. A woman's much shorter refractory period may enable her, if restimulated during or soon after resolution, to have more orgasms.

sexual response cycle
the four stages of sexual responding described by Masters and Johnson—excitement, plateau, orgasm, and resolution.

refractory period
in human sexuality, a resting period that occurs after orgasm, during which a person cannot achieve another orgasm.

The Psychology of Sex

39-3 How do external and imagined stimuli contribute to sexual arousal?

FYI

As you learned in Module 9, there is also a *refractory period* in neural processing—the brief resting pause that occurs after a neuron has fired.

Biological factors powerfully influence our sexual motivation and behavior. Yet the wide variations over time, across place, and among individuals document the great influence of psychological factors as well (**Figure 39.1**).

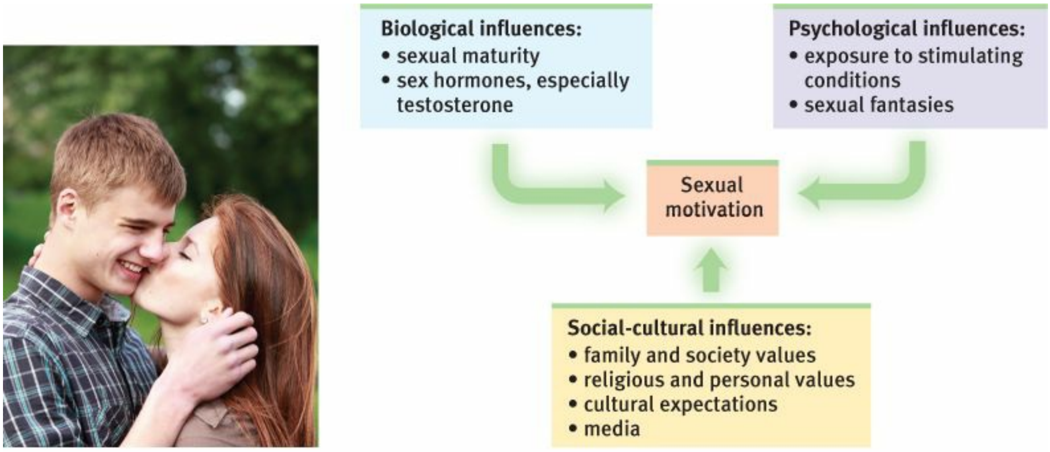
Biological influences:
• sexual maturity
• sex hormones, especially testosterone
Psychological influences:
• exposure to stimulating conditions
• sexual fantasies
Sexual motivation
Social-cultural influences:
• family and society values
• religious and personal values
• cultural expectations
• media

Figure 39.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Photo: Petrenko Andriy/Shutterstock

Figure 39.1 Biopsychosocial influences on sexual motivation

Compared with our motivation for eating, our sexual motivation is less influenced by biological factors. Psychological and social-cultural factors play a bigger role.

External Stimuli

Men and women become aroused when they see, hear, or read erotic material (Heiman, 1975; Stockton & Murnen, 1992). In men more than in women, *feelings* of sexual arousal closely mirror their (more obvious) physical genital responses (Chivers et al., 2010).

People may find sexual arousal either pleasing or disturbing. (Those who wish to control their arousal often limit their exposure to arousing materials, just as those wishing to avoid overeating limit their exposure to tempting food cues.) With repeated exposure to any stimulus, including an erotic stimulus, the emotional response lessens, or *habituates*. During the 1920s, when Western women's hemlines rose to the knee, an exposed leg made hearts flutter. Today, many would barely notice.

Can exposure to sexually explicit material have adverse effects? Research indicates that it can, in three ways.

- **BELIEVING RAPE IS ACCEPTABLE.** Depictions of women being sexually coerced—and appearing to enjoy it—have increased viewers' belief in the false idea that women want to be overpowered, and have increased male viewers' expressed willingness to hurt women and to commit rape after viewing such scenes (Allen et al., 1995, 2000; Foubert et al., 2011; Zillmann, 1989).
- **REDUCING SATISFACTION WITH A PARTNER'S APPEARANCE OR WITH A RELATIONSHIP.** After viewing images or erotic films of sexually attractive women and men, people have judged an average person, their own partner, or their spouse as less attractive. And they have found their own relationship less satisfying (Kenrick & Gutierres, 1980; Lambert et al., 2012). Perhaps reading or watching erotica's unlikely scenarios creates expectations that few men and women can fulfill.
- **DESENSITIZATION.** Some studies have found that extensive online pornography exposure desensitizes young men to normal sexuality, thus contributing to erectile problems, lowered sexual desire, and diminished brain activation in response to sexual images. "Porn is messing with your manhood," argue Philip Zimbardo and colleagues (2016). In one brain-imaging study, men who frequently watched pornography had smaller-sized brain regions that aid sexual pleasure (Kühn & Gallinat,

2014).

> “*Ours is a society which stimulates interest in sex by constant titillation. . . . Cinema, television, and all the formidable array of our marketing technology project our very effective forms of titillation and our prejudices about man as a sexy animal into every corner of every hovel in the world.*”
>
> *Germaine Greer, 1984*

Imagined Stimuli

The brain, it has been said, is our most significant sex organ. The stimuli inside our heads—our imagination—can influence sexual arousal and desire. Lacking genital sensation because of a spinal cord injury, people can still feel sexual desire (Willmuth, 1987).

Both men and women (about 95 percent of each) report having sexual fantasies, which for a few women can, by themselves, produce orgasms (Komisaruk & Whipple, 2011). Men, regardless of *sexual orientation* (see Module 53), tend to have more frequent, more physical, and less romantic fantasies (Schmitt et al., 2012). They also prefer less personal and faster-paced sexual content in books and videos (Leitenberg & Henning, 1995).

Sex and Human Relationships

Surely one significance of such intimacy is its expression of our profoundly social nature. In one national study that followed participants to age 30, later first sex predicted greater satisfaction in one’s marriage or partnership (Harden, 2012). Another study asked 2035 married people when they started having sex (while controlling for education, religious engagement, and relationship length). Those whose relationship first developed to a deep commitment, such as marriage, not only reported greater relationship satisfaction and stability but also better sex (Busby et al., 2010; Galinsky & Sonenstein, 2013). For both men and women, but especially for women, sex is more satisfying (with less regret and more orgasms) for those in a committed relationship, rather than a brief sexual hook-up (Armstrong et al., 2012; Garcia et al., 2012, 2013). Commitment enhances contentment.

Check Your Understanding

Ask Yourself

- What psychological and social-cultural factors have affected your sexual motivation?

Test Yourself

- The primary male sex hormone is ____________. The primary female sex hormones are the _____________.
- What factors influence our sexual motivation and behavior?
- How might the drive-reduction theory and arousal theory explain our sexual motivation?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 39 REVIEW

39-1 How do hormones influence human sexual motivation?

- For all but the tiny fraction of us considered *asexual,* dating and mating become a priority from puberty on. The female *estrogens* and male *testosterone* hormones influence human sexual behavior less directly than they influence sexual behavior in other species.
- These hormones direct sexual development in the prenatal period; trigger development of sexual characteristics in adolescence; and help activate sexual behavior from puberty to late adulthood.
- Women's sexuality, as well as men's, is responsive to testosterone levels. Short-term shifts in testosterone level are normal in men, partly in response to stimulation.

39-2 What is the human *sexual response cycle*?

- William Masters and Virginia Johnson described four stages in the human *sexual response cycle:* excitement, plateau, orgasm (which involves similar feelings and brain activity in males and females), and resolution. Males then enter a *refractory period,* during which renewed arousal and orgasm are impossible.

39-3 How do external and imagined stimuli contribute to sexual arousal?

- External stimuli can trigger sexual arousal in both men and women.
- Viewing sexually coercive material can lead to increased acceptance of violence toward women. Viewing sexually explicit materials can cause people to perceive their partners as comparatively less appealing and to devalue their relationships.
- Imagined stimuli (dreams and fantasies) help trigger sexual arousal.

Multiple-Choice Questions

1. ________ is/are the main female sex hormone(s).

a. Habituation.
b. Menopause.
c. The subcortica.
d. The estrogens.
e. Testosterone.

2. The research of Masters and Johnson found that in the sexual response cycle

a. resolution is the final phase of the cycle.
b. orgasm is the final phase of the cycle.
c. plateau is the final phase of the cycle.
d. excitement follows the plateau phase.
e. plateau follows the resolution phase.

3. Which of the following is true concerning the effect of sex hormones?

a. Hormone injections can be used to easily manipulate sexual behavior in men but not in women.
b. Hormone injections can be used to easily manipulate sexual behavior in both men and women.
c. Sex hormones have a more direct effect on nonhuman animals than on humans.
d. The levels of sex hormones are more constant in women than in men.
e. Women’s estrogen levels do not rise during ovulation.

Practice FRQs

1. Describe one influence on sexual motivation from each of the following categories:

- Biological
- Psychological

- Social-cultural

Answer

1 point: Biological influences on sexual motivation could include hormones or sexual orientation. Page 420

1 point: Psychological influences on sexual motivation could include exposure to sexually stimulating material or fantasizing. Page 420

1 point: Social-cultural influences on sexual motivation could include religious and personal values or the media. Page 420

2. As a teenager, Vincent viewed a large amount of violent pornographic material online. Describe two ways that this behavior as a teen may impact his sexual behaviors as an adult.

(2 points)

Module **40 Affiliation and Achievement**

LEARNING TARGETS

- **40-1 Describe the evidence that points to our human affiliation need—our need to belong.**
- **40-2 Discuss how social networking influences us.**
- **40-3 Discuss *achievement motivation.***

The Need to Belong

40-1 What evidence points to our human affiliation need—our need to belong?

Separated from friends or family—alone in prison or at a new school or in a foreign land—most people feel keenly their lost connections with important others. We are what the ancient Greek philosopher Aristotle called *the social animal.* The more people connect with friends, the greater their satisfaction with life (Li & Kanazawa, 2016). “Without friends,” wrote Aristotle in his *Nichomachean Ethics*, “no one would choose to live, though he had all other goods.” This deep *need to belong*—our **affiliation need**—seems a key human motivation (Baumeister & Leary, 1995). Mark Zuckerberg (2012) understands this, noting that he founded Facebook “to accomplish a social mission—to make the world more open and connected.” Although people vary in their wish for privacy and solitude, most of us seek to affiliate—to become strongly attached to certain others in enduring, close relationships. Human beings, contended personality theorist Alfred Adler, have an “urge to community” (Ferguson, 1989, 2001, 2010).

affiliation need

the need to build relationships and to feel part of a group.

The Benefits of Belonging

Social bonds boosted our early ancestors’ chances of survival. Adults who formed attachments were more likely to survive, to reproduce, and to co-nurture their offspring to maturity. Attachment bonds motivated caregivers to keep children close, calming them and protecting them from threats (Esposito et al., 2013). Indeed, to be “wretched” literally means, in its Middle English origin *(wrecched),* to be without kin nearby.

Photodisc/Getty Images

Cooperation also enhanced survival. In solo combat, our ancestors were not the toughest predators. But as hunters, they learned that six hands were better than two. As food gatherers, they gained protection from two-footed and four-footed enemies by traveling in groups. Those who felt a need to belong survived and reproduced most successfully, and their genes now predominate. Our innate need to belong drives us to befriend people who cooperate and to avoid those who exploit (Feinberg et al., 2014). People in every society on Earth belong to groups and (as Module 77 explains) prefer and favor "us" over "them." Having a social identity—feeling part of a group—boosts people's health and well-being (Allen et al., 2015; Greenaway et al., 2015, 2016).

Do you have close friends—people with whom you freely disclose your ups and downs? Having someone who rejoices with us over good news helps us feel better about both the news and the friendship (Reis et al., 2010). A stranger's casual thank-you can warm our heart (Williams & Bartlett, 2015). And close friends can literally make us feel warm, as if we are holding a soothing bowl of warm soup (Inagaki & Eisenberger, 2013). The need to belong runs deeper, it seems, than any need to be rich. One study found that *very* happy university students were distinguished not by their money but by their "rich and satisfying close relationships" (Diener & Seligman, 2002).

The need to belong colors our thoughts and emotions. We spend a great deal of time thinking about actual and hoped-for relationships. When relationships form, we often feel joy. Falling in mutual love, people have been known to feel their cheeks ache from their irrepressible grins. Asked, “What is necessary for your happiness?” or “What is it that makes your life meaningful?” most people have mentioned—before anything else—close, satisfying relationships with family, friends, or romantic partners (Berscheid, 1985). Happiness hits close to home.

Consider: What was your most satisfying moment in the past week? Researchers asked that question of American and South Korean university students, then asked them to rate how much that moment had satisfied various needs (Sheldon et al., 2001). In both countries, the peak moment had satisfied self-esteem and relatedness-belonging needs. When we satisfy our need for relatedness in balance with two other basic psychological needs—*autonomy* (a sense of personal control) and *competence*—we experience a deep sense of well-being, our performance improves, and our self-esteem rides high (Cerasoli et al., 2016; Deci & Ryan, 2009; Milyavskaya et al., 2009). Indeed, *self-esteem* is a gauge of how valued and accepted we feel (Leary, 2012).

Small wonder, then, that our social behavior so often aims to increase our feelings of belonging. To gain acceptance, we generally conform to group standards. We wait in lines and obey laws. We monitor our behavior, hoping to make a good impression. We spend billions on clothes, cosmetics, and diet and fitness aids—all motivated by our search for love and acceptance.

Thrown together in groups at school, at band camp, or in team sports, we form bonds. Parting, we feel distress. We promise to call, to write, to return for reunions. By drawing a sharp circle around “us,” the need to belong feeds both deep attachments to those inside the circle (loving families, faithful friendships, and team loyalty) and hostilities toward those outside (teen gangs, ethnic rivalries, and fanatic nationalism). Feelings of love activate brain reward and safety systems. In one experiment, deeply in love university students exposed to heat felt less pain when looking at their beloved's picture (Younger et al., 2010). Pictures of our loved ones also activate a brain region—the prefrontal cortex—that dampens feelings of physical pain (Eisenberger et al., 2011). Love is a natural painkiller.

Even when bad relationships end, people suffer. In one 16-nation survey, and in repeated U.S. surveys, separated and divorced people have been half as likely as married people to say they are "very happy" (Inglehart, 1990; NORC, 2016a). Is that simply because happy people more often marry and stay married? A national study following British lives through time revealed that, even after controlling for premarital life satisfaction, "the married are still more satisfied, suggesting a causal effect" of marriage (Grover & Helliwell, 2014). Divorce also predicts earlier mortality. Studies that have followed 6.5 million people in 11 countries reveal that, compared with married people, separated and divorced people are at greater risk for early death (Sbarra et al., 2011).

VINCENT YU/AP Images

The need to connect Six days a week, women from the Philippines work as domestic helpers in thousands of Hong Kong households. On Sundays, they throng to the central business district to picnic, dance, sing, talk, and laugh. "Humanity could stage no greater display of happiness," reported one observer (*The Economist*, 2001).

Children who move through a series of foster homes or through regular family relocations know the fear of being alone. After repeated disruption of budding attachments, they may have difficulty forming deep relationships (Oishi & Schimmack, 2010b). The evidence is clearest at the extremes. As we will see in Module 48, children who grow up in institutions without a sense of belonging to anyone, or who are locked away at home and severely neglected tend to become withdrawn, frightened, even speechless. Feeling insecurely attached to others during childhood can persist into adulthood in two main forms (Fraley et al., 2011). One is *anxiety:* constantly craving acceptance but remaining vigilant to signs of possible rejection. The other is *avoidance:* feeling such discomfort over getting close to others that avoidant strategies are used to maintain distance.

No matter how secure our early years were, we all experience anxiety, loneliness, jealousy, or guilt when something threatens or dissolves our social ties. Much as life's best moments occur when close relationships begin—making a new friend, falling in love, having a baby—life's worst moments happen when close relationships end (Beam et al., 2016). Bereaved, we may feel life is empty or pointless, and we may overeat to fill that emptiness (Yang et al., 2016). Even the first months of living away from home on a college campus can be distressing (English et al., 2017). But our need to belong pushes us to form new social connections (Oishi et al., 2013).

For immigrants and refugees moving alone to new places, the stress and loneliness can be depressing. After years of placing individual families in isolated communities, many government policy makers began to see the wisdom of encouraging *chain migration* (Pipher, 2002). The second Syrian refugee family settling in a town generally has an easier adjustment than the first.

Social isolation can put us at risk for mental decline and ill health (Cacioppo et al., 2015). Older adults make more doctor visits, if lonely, and are at greater risk for dementia (Gerst-Emerson & Jayawardhana, 2015; Holwerda et al., 2014). But if feelings of acceptance and connection increase sufficiently, so will self-esteem, positive feelings, and physical health (Blackhart et al., 2009; Holt-Lunstad et al., 2010; Smart Richman & Leary, 2009). A socially connected life is often a happy and healthy life.

> “*Just give me the death penalty, man.*”

Paul Redd, from solitary confinement, 2015

The Pain of Being Shut Out

Can you recall feeling excluded or ignored or shunned? Perhaps you were unfriended or ignored online. Perhaps others gave you the silent treatment, avoided you, looked away, mocked you, or shut you out in some other way. Or perhaps you have felt excluded when among people speaking an unfamiliar language (Dotan-Eliaz et al., 2009).

All these experiences are instances of **ostracism**—of social exclusion (Williams, 2007, 2009). Worldwide, humans use many forms of ostracism—exile, imprisonment, solitary confinement—to punish, and therefore control, social behavior. For children, even a brief time-out in isolation can be punishing. Asked to describe personal episodes that made them feel especially *bad* about themselves, people will—about four times in five—describe a broken or painful social relationship (Pillemer et al., 2007).

ostracism

deliberate social exclusion of individuals or groups.

Being shunned threatens one’s need to belong (Vanhalst et al., 2015; Wirth et al., 2010). “It’s the meanest thing you can do to someone, especially if you know they can’t fight back. I never should have been born,” said Lea, a lifelong victim of the silent treatment by her mother and grandmother. Like Lea, people often respond to ostracism with initial efforts to restore their acceptance, with depressed moods, and finally with withdrawal. Prisoner William Blake (2013) has spent more than a quarter-century in solitary confinement. “I cannot fathom how dying any death could be harder and more terrible than living through all that I have been forced to endure,” he observed. To many, social exclusion is a sentence worse than death.

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Enduring the pain of ostracism White cadets at the United States Military Academy at West Point ostracized Henry Flipper for years, hoping he would drop out. He persevered in spite of their cruelty and in 1877 became the first African-American West Point graduate.

To experience ostracism is to experience real pain, as social psychologists Kipling Williams and his colleagues were surprised to discover in their studies of exclusion on social media (Gonsalkorale & Williams, 2006). (Perhaps you can recall the feeling of having few followers on a social networking site, or of having a text message or e-mail go unanswered.) Such ostracism, they discovered, takes a toll: It elicits increased activity in brain areas, such as the *anterior cingulate cortex,* that also respond to physical pain (Eisenberger, 2015; Rotge et al., 2015).

When people view pictures of romantic partners who caused their hearts to break, their brains and bodies begin to ache (Kross et al., 2011). That helps explain another surprising finding: The pain reliever acetaminophen (as in Tylenol) lessens *social* as well as physical pain (DeWall et al., 2010). Across cultures, people use the same words (for example, *hurt, crushed*) for social pain and physical pain (MacDonald & Leary, 2005). Psychologically, we seem to experience social pain with the same emotional unpleasantness that marks physical pain.

Pain, whatever its source, focuses our attention and motivates corrective action. Rejected and unable to remedy the situation, people may relieve stress by seeking new friends, eating calorie-laden comfort foods, or strengthening their religious faith (Aydin et al., 2010; Maner et al., 2007; Sproesser et al., 2014). Or they may turn hostile. Ostracism breeds disagreeableness, which leads to further ostracism (Hales et al., 2016). In one series of experiments, researchers told some students (who had taken a personality test) that they were “the type likely to end up alone later in life,” or that people they had met didn’t want them in a group that was forming (Gaertner et al., 2008; Twenge et al., 2001).[1] They told other students that they would have “rewarding relationships throughout life,” or that “everyone chose you as someone they’d like to work with.” Those who were excluded became much more likely to engage in self-defeating behaviors and to act in disparaging or aggressive ways against those who had excluded them (blasting them with noise, for example). “If intelligent, well-adjusted, successful . . . students can turn aggressive in response to a small laboratory experience of social exclusion,” noted the research team, “it is disturbing to imagine the aggressive tendencies that might arise from . . . chronic exclusion from desired groups in actual social life.” Indeed, as Williams (2007) has observed, ostracism “weaves through case after case of school violence.”

CBS Photo Archive/Getty Images

Social acceptance and rejection Successful participants on the reality TV show *Survivor* form alliances and gain acceptance among their peers. The rest receive the ultimate social punishment as they are “voted off the island.”

> “*If no one turned around when we entered, answered when we spoke, or minded what we did, but if every person we met ‘cut us dead,’ and acted as if we were non-existing things, a kind of rage and impotent despair would ere long well up in us.*”

William James, Principles of Psychology, *1890/1950, pp. 293–294*

Connecting and Social Networking

40-2 How does social networking influence us?

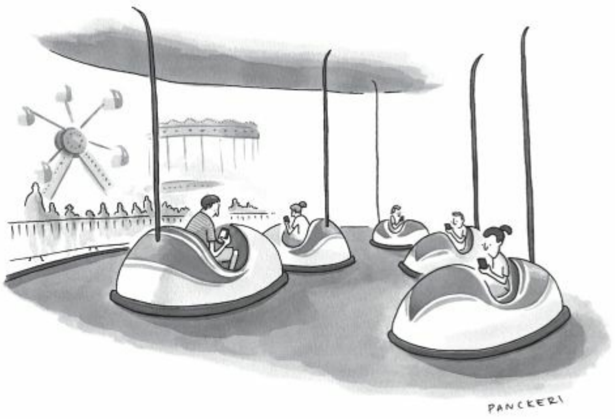
As social creatures, we live for connection. Researcher George Vaillant (2013) was asked what he had learned from studying 238 Harvard University men from the 1930s to the end of their lives. He replied, “Happiness is love.” A South African Zulu saying captures the idea: *Umuntu ngumuntu ngabantu*—“a person is a person through other persons.”

AP® EXAM TIP

Free-response questions on the AP® exam often ask students to apply psychological principles to real-life situations. It’s easy to imagine a question that deals with social media.

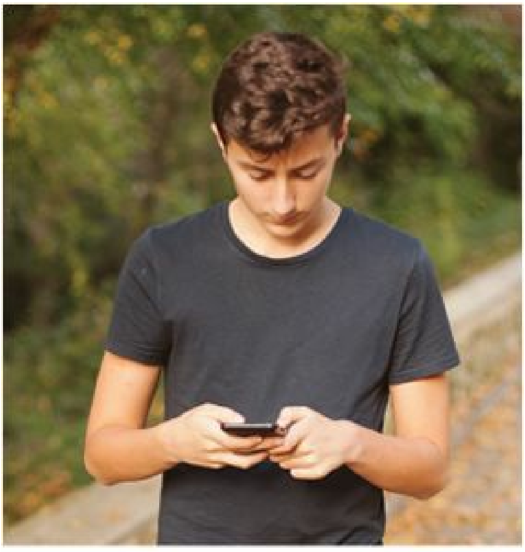
Mobile Networks and Social Media

Look around and see humans connecting: talking, tweeting, texting, posting, chatting, social gaming, e-mailing. Walking from class to class, you may see students glued to their phones, making little eye contact with passersby (or perhaps that’s you?). During class breaks, do you observe students getting to know each other—or silently checking their phones, as one research team’s phone app counted college students doing 56 times a day (Elias et al., 2016)? The changes in how we connect have been fast and vast.



Drew Panckeri The New Yorker Collection/The Cartoon Bank

- **MOBILE PHONES.** At the end of 2016, 95 percent of the world's 7.5 billion people lived in an area covered by a mobile-cellular network (ITU, 2016).
- **TEXTS.** The typical U.S. teen with a cell phone sends 30 texts a day (Lenhart, 2015). Half of 18- to 29-year-olds with a cell phone check it multiple times per hour, and "can't imagine . . . life without [it]" (Newport, 2015; Saad, 2015).
- **THE INTERNET.** Worldwide in 2015, 68 percent of adults used the Internet (Poushter, 2016).
- **SOCIAL NETWORKING.** Among 2014's entering American college students, 94 percent were using social networking sites (Eagan et al., 2014). With one's friends online, it's hard not to be: Check in or miss out.



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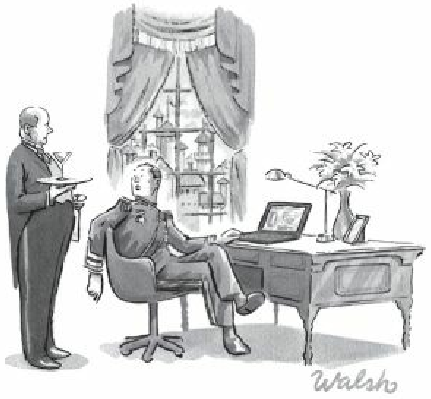
The Net Result: Social Effects of Social Networking

By connecting like-minded people, the Internet serves as a social amplifier. In times of social crisis or personal stress, it provides information and supportive connections. It enables people to share their experiences and compare their lives with others, though it can be depressing when one garners few likes or has lots of bragging friends (Blease, 2015; Verduyn et al., 2015). The Internet also functions as an online matchmaker (as I [ND] can attest: I met my wife online; more on this in Module 79). Dating websites aren't right for everyone, but they can effectively match partners who share desired characteristics (Bruch et al., 2016). As electronic communication has become an integral part of life, researchers continue to explore how it affects our relationships. Online networking is double-edged: Nature has designed us for face-to-face relationships, and those who spend hours online are *less* likely to know and draw help from their real-world neighbors. But it does help us connect with friends, stay in touch with extended family, and find support when facing challenges (Liu et al., 2016; Pinker, 2014; Rainie et al., 2011). When used in moderation, social networking predicts longer life (Hobbs et al., 2016).

DOES ELECTRONIC COMMUNICATION STIMULATE HEALTHY SELF-DISCLOSURE? *Self-disclosure* is sharing ourselves—our joys, worries, and weaknesses—with others. As we will see later in this unit, confiding can be a healthy way of coping with day-to-day challenges. When communicating electronically rather than face-to-face, we often are less focused on others' reactions. We are less self-conscious and thus less inhibited. Sometimes this is taken to an extreme, as when bullies hound a victim, hate groups post messages promoting bigotry or crimes, or teens send photos of themselves they later regret. More often, however, the increased self-disclosure serves to deepen friendships (Valkenburg & Peter, 2009).



Liam Francis Walsh The New Yorker Collection
/The Cartoon Bank

"The women on these dating sites don't seem to believe I'm a prince."

DOES SOCIAL NETWORKING PROMOTE NARCISSISM?

Narcissism is self-esteem gone wild. Narcissistic people are self-important, self-focused, and self-promoting. Personality tests may assess narcissism with items such as "I like to be the center of attention." People with high narcissism test scores are especially active on social networking sites (Liu & Baumeister, 2016). They collect more superficial "friends." They offer more staged, glamorous photos. They retaliate more against negative comments. And, not surprisingly, they *seem* more narcissistic to strangers (Buffardi & Campbell, 2008; Weiser, 2015).

narcissism

excessive self-love and self-absorption.

For narcissists, social networking sites are more than a gathering place; they are a feeding trough. In one study, college students were *randomly assigned* either to edit and explain their online profiles for 15 minutes, or to use that time to study and explain a Google Maps routing (Freeman & Twenge, 2010). After completing their tasks, all were tested. Who then scored higher on a narcissism measure? Those who had spent the time focused on themselves.

Maintaining Balance and Focus

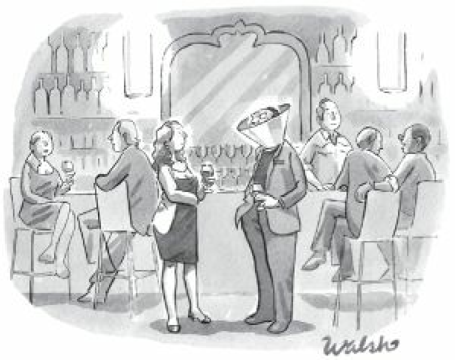
In both Taiwan and the United States, excessive online socializing and gaming have correlated with lower grades or increased anxiety and depression (Brooks, 2015; Lepp et al., 2014; Walsh et al., 2013). In one U.S. survey, 47 percent of the heaviest users of the Internet and other media were receiving mostly C grades or lower, as were just 23 percent of the lightest users (Kaiser Family Foundation, 2010). In another national survey, young adults who used seven or more social media platforms were three times more likely to be depressed or anxious than those who used two or fewer (Primack et al., 2016).

In today's world, most of us are challenged to maintain a healthy balance between our real-world and online time. Experts offer some practical suggestions:

- **MONITOR YOUR TIME.** Keep a log of how you use your time. Then ask yourself, "Does my time use reflect my priorities? Am I spending more or less time online than I intended? Is my time online interfering with my school or work performance or relationships? Have family or friends commented on this?"
- **MONITOR YOUR FEELINGS.** Ask yourself, "Am I emotionally distracted by my online interests? When I disconnect and move to another activity, how do I feel?"
- **"HIDE" FROM YOUR INCESSANTLY POSTING ONLINE FRIENDS WHEN NECESSARY.** And in your own postings, practice the golden rule: Ask yourself, "Is this something I'd care about if someone else posted it?"
- **WHEN STUDYING, GET IN THE HABIT OF CHECKING YOUR PHONE AND E-MAIL LESS OFTEN.** Selective attention—the flashlight of your mind—can be in only one place at a time. When we try to do two things at once, we don't do either one of them very well (Willingham, 2010). If you want to study or work productively, resist the temptation to always be available. Disable sound alerts, vibration, and pop-ups. In one experiment, randomly selected people who kept their e-mail closed and checked e-mail just three times a day enjoyed a significant reduction in

stress (Kushlev & Dunn, 2015). (To avoid distraction, I [DM] am proofing and editing this unit in a coffee shop without Wi-Fi.)

- **REFOCUS BY TAKING A NATURE WALK.** People learn better after a peaceful walk in a park, which—unlike a walk on a busy street—refreshes our capacity for focused attention (Berman et al., 2008). Connecting with nature boosts our spirits and sharpens our minds (Zelenski & Nisbet, 2014).



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/The Cartoon Bank

"It keeps me from looking at my phone every two seconds."

As psychologist Steven Pinker (2010) said, "The solution is not to bemoan technology but to develop strategies of self-control, as we do with every other temptation in life."

Check Your Understanding

Ask Yourself

- Have there been times when you felt out of the loop with family and friends, or even ostracized by them? How did you respond?

Test Yourself

- How have students reacted in studies where they were made to feel rejected and unwanted? What helps explain these results?
- Social networking tends to _______________ (strengthen/weaken) your relationships with people you already know and _______________ (increase/decrease) your self-disclosure.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Achievement Motivation

40-3 What is *achievement motivation?*

Some motives seem to have little obvious survival value. Billionaires may be motivated to make ever more money, reality TV stars to attract ever more social media followers, politicians to achieve ever more power, daredevils to seek ever greater thrills. Such motives seem not to diminish when they are fed. The more we achieve, the more we may need to achieve. Psychologist Henry Murray (1938) defined **achievement motivation** as a desire for significant accomplishment, for mastering skills or ideas, for control, and for attaining a high standard.

achievement motivation

a desire for significant accomplishment, for mastery of skills or ideas, for control, and for attaining a high standard.

Thanks to their persistence and eagerness for challenge, people with high achievement motivation do achieve more. One famous study followed the lives of 1528 California children whose intelligence test scores were in the top 1 percent. Forty years later, when researchers compared those who were most and least successful professionally, they found a motivational difference. Those most successful were more ambitious, energetic, and persistent. As children, they had more active hobbies. As adults, they participated in more groups and sports (Goleman, 1980). Gifted children are able learners. Accomplished adults are tenacious doers. Most of us are energetic doers when starting and when finishing a project. It’s easiest—have you noticed?—to get stuck in the middle. That’s when high achievers keep going (Bonezzi et al., 2011).

> “*Genius is 1% inspiration and 99% perspiration.*”
>
> *Thomas Edison (1847–1931)*

In some studies of both secondary school and university students, self-discipline has surpassed intelligence test scores in predicting school performance, attendance, and graduation honors. For school performance, “discipline outdoes talent,” concluded researchers Angela Duckworth and Martin Seligman (2005, 2006).

Discipline focuses and refines talent. By their early twenties, top violinists have accumulated thousands of lifetime practice hours—in fact, double the practice time of other violin students aiming to be teachers (Ericsson, 2001, 2006, 2007). A study of outstanding scholars, athletes, and artists found that all were highly motivated and self-disciplined, willing to dedicate hours every day to the pursuit of their goals (Bloom, 1985). But as young Mozart composing at age 8 illustrates, native talent matters, too (Hambrick & Meinz, 2011; Ruthsatz & Urbach, 2012). In sports, music, and chess, people’s practice-time differences, while significant, account for a third or less of their performance differences (Hambrick et al., 2014a,b; Macnamara et al., 2014, 2016; Ullén et al., 2016). High achievers benefit from their passion and perseverance, but the superstars among them are also distinguished by their extraordinary natural talent.

Duckworth (2016) has a name for passionate dedication to an ambitious, long-term goal: **grit**. When combined with self-control (regulating one’s attention and actions in the face of temptation), gritty goal-striving can produce great achievements. “If you want to look good in front of thousands,” the saying goes, “you have to outwork thousands in front of nobody.”

grit

in psychology, passion and perseverance in the pursuit of long-term goals.

From Calum's Road by Roger Hutchinson, reproduced courtesy of Birlinn Ltd.

Calum's road: What grit can accomplish Having spent his life on the Scottish island of Raasay, farming a small patch of land, tending its lighthouse, and fishing, Malcolm ("Calum") MacLeod (1911–1988) felt anguished. His local government repeatedly refused to build a road that would enable vehicles to reach his north end of the island. With the once-flourishing population there having dwindled to two—MacLeod and his wife—he responded with heroic determination. One spring morning in 1964, MacLeod, then in his fifties, gathered an ax, a chopper, a shovel, and a wheelbarrow. By hand, he began to transform the existing footpath into a 1.75-mile road (Miers, 2009).

"With a road," a former neighbor explained, "he hoped new generations of people would return to the north end of Raasay," restoring its culture (Hutchinson, 2006). Day after day he worked through rough hillsides, along hazardous cliff faces, and over peat bogs. Finally, 10 years later, he completed his supreme achievement. The road, which the government has since surfaced, remains a visible example of what vision plus determined grit can accomplish. It bids us each to ponder: What "roads"—what achievements—might we, with sustained effort, build in the years before us?

Although intelligence is distributed like a bell curve, achievements are not. This tells us that achievement involves much more than raw ability. That is why smart parenting, teaching, and managing engages people's intrinsic motivations to achieve. That is why organizational psychologists seek ways to motivate ordinary people doing ordinary jobs (see Module 82). And that is why each of us can adopt some research-based strategies for achieving our goals:

1. ***Do make that resolution.*** Challenging goals motivate achievement (Harkin et al., 2016). Concrete goals—“finish the paper by Tuesday”—direct attention and motivate persistence.
2. ***Announce the goal to friends or family.*** We’re more likely to follow through after making a public commitment.
3. ***Develop an implementation plan***—an action strategy that specifies when, where, and how we will progress toward our goal. People who flesh out goals with detailed plans become more focused and more likely to succeed (Gollwitzer & Oettingen, 2012). Better to center on small steps—the day’s running target—than to fantasize the marathon.
4. ***Create short-term rewards that support long-term goals.*** Compared to delayed rewards, immediate rewards better predict persistence (Woolley & Fishbach, 2017).
5. ***Monitor and record progress***, perhaps aided by an activity tracker. All the better when that progress is displayed publicly rather than kept secret (Harkin et al., 2016).
6. ***Create a supportive environment.*** When trying to eat healthily, keep junk food out of the cupboards. Use small plates and bowls. When focusing on a project, hole up in the library. When sleeping, stash the cell phone. Such “situational self-control strategies” prevent tempting impulses (Duckworth et al., 2016).
7. ***Transform the hard-to-do behavior into a must-do habit.*** Habits form when we repeat behaviors in a given context (Module 28). As our behavior becomes linked with the context, our next experience of that context evokes our habitual response. To increase our self-control, to connect our resolutions with positive outcomes, the key is forming “beneficial habits” (Galla & Duckworth, 2015). Do something every day for about two months and it will become an ingrained habit.

To achieve important life goals, we often know what to do. We *know* that a full night’s sleep boosts our alertness, energy, and mood. We *know* that exercise lessens depression and anxiety, sculpts our bodies, and strengthens our hearts and minds. We *know* that what we put into our bodies—junk food or balanced nutrition, addictive substances or clean air—affects our health and longevity. Alas, as T. S. Eliot foresaw, “Between the idea and the reality . . . Falls the Shadow.” Nevertheless, by taking these six steps—resolving, announcing, planning, monitoring, controlling, and persistently acting—we can create a bridge between the idea and the reality.

* * *

We have seen that identifiable physiological mechanisms drive some motives, such as hunger (though learned tastes and cultural expectations matter, too). Other motives, such as our needs for affiliation and achievement, are more obviously driven by psychological factors, such as the social rewards that come from belonging and being successful. What unifies all motives is their common effect: the energizing and directing of behavior.

✓ Check Your Understanding

Ask Yourself

- What goal would you like to achieve? How might you use the seven strategies offered in this section to meet that goal?

Test Yourself

- What have researchers found to be an even better predictor of school performance than intelligence test scores?
- How might drive-reduction theory and arousal theory explain our affiliation and achievement needs?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 40 REVIEW

40-1 What evidence points to our human affiliation need—our need to belong?

- Our need to *affiliate* or belong—to feel connected and identified with others—had survival value for our ancestors, which may explain why humans in every society live in groups.
- Social bonds help us to be healthier and happier. Feeling loved activates brain regions associated with reward and safety systems.
- *Ostracism* is the deliberate exclusion of individuals or groups. People often respond to ostracism with initial efforts to restore their acceptance, with depressed moods, and finally with withdrawal.
- Social isolation can put us at risk mentally and physically. People suffer when socially excluded, and they may engage in self-defeating or antisocial behaviors.

40-2 How does social networking influence us?

- We connect with others through social networking, strengthening our relationships with those we already know.
- When networking, people tend toward increased self-disclosure. People with high *narcissism* are especially active on social networking sites.
- Working out strategies for self-control and disciplined use can help people maintain a healthy balance between their real-world and online time.

40-3 What is *achievement motivation?*

- *Achievement motivation* is a desire for significant accomplishment, for mastery of skills or ideas, for control, and for attaining a high standard.
- High achievement motivation leads to greater success, especially when

combined with determined, persistent *grit*.

Multiple-Choice Questions

1. When asked, “What is it that makes your life meaningful?”, people are most likely to answer:

a. money.
b. close relationships.
c. a satisfying career.
d. an average level of intelligence.
e. a skill such a cooking, or a talent such as playing an instrument.

2. Peyton sits by herself most days at lunch because her friends are refusing to speak to her. Her friends are demonstrating

a. grit.
b. narcissism.
c. empathy.
d. positive reinforcement.
e. ostracism.

3. Researchers studying the relationship between heavy Internet use and grades have found that

a. low use is positively correlated with grades.
b. high use is positively correlated with grades.
c. high use is negatively correlated with grades.
d. an illusory correlation exists between Internet use and grades.
e. no correlation exists between these two variables.

4. Research on achievement motivation has found that

a. people who demonstrate grit tend to have lower levels of achievement.
b. those with high levels of self-discipline have higher levels of achievement.
c. achievement is simply due to ability.
d. people who keep their goals to themselves are more successful than

those who share them with others.

e. those who have a plan succeed less often than those who do not.

Practice FRQs

1. Glenda finds herself constantly checking her phone and thinking about the activities she engages in online. Explain how the following behaviors could have a negative impact on her life, related to her use of social media:

   - Ostracism
   - Narcissism

Answer

1 point: Glenda may feel ostracized if her friends do not respond to her posts. This sense of social exclusion will cause her to feel bad about herself. Page 425

1 point: Glenda may develop narcissism—a sense of herself as more important than she is. Her self-focused and self-promoting behaviors may result in her having many "friends" or followers online, but these superficial relationships will not provide her with a real sense of belonging. Page 427

2. Jin has decided that during his senior year he wishes to focus more on his academics and earn better grades. Explain how each of the following could help him earn better grades:

   - Grit
   - His peer group

   Explain how each of the following could hinder him in his pursuit of better grades:

   - Ostracism
   - Narcissism

(4 points)

Module **41 Theories and Physiology of Emotion**

LEARNING TARGETS

- 41-1 Describe how arousal, expressive behavior, and cognition interact in emotion.
- 41-2 Explain whether we can experience emotions without consciously interpreting and labeling them.
- 41-3 Describe the basic emotions, and the link between emotional arousal and the autonomic nervous system.
- 41-4 Discuss whether different emotions activate different physiological and brain-pattern responses.
- 41-5 Discuss the effectiveness of polygraphs in using body states to detect lies.

Motivated behavior often is driven by powerful emotions that color our lives. In times of stress, emotions can disrupt your life, or save it. Fear, anger, sadness, joy, and love are psychological states that also entail physical reactions. Nervous about an important encounter, we feel stomach butterflies. Anxious over public speaking, we frequent the bathroom. Smoldering over a family conflict, we get a splitting headache.

You can surely recall a time when emotion overwhelmed you. I [DM] retain a flashbulb memory of the day I went to a huge store and brought along Peter, my toddler first-born child. As I set Peter down on his feet for a moment to do some paperwork, a passerby warned, “You’d better be careful or you’ll lose that boy!” Not more than a few breaths later, I turned and found no Peter beside me.

With mild anxiety, I peered around one end of the customer service counter. No Peter in sight. With more anxiety, I peered around the other end. No Peter there, either. Now, with my heart accelerating, I circled the neighboring counters. Still no Peter anywhere. As anxiety turned to panic, I began racing up and down the store aisles. He was nowhere to be found. The alerted store manager used the public-address system to ask customers to assist in looking for a missing child. Soon after, I passed the customer who had warned me. “I told you that you were going to lose him!” he now scolded. With visions of kidnapping (strangers routinely adored that beautiful child), I braced for the unthinkable possibility that my negligence had caused me to lose what I loved above all else, and that I might have to return home and face my wife without our only child.

But then, as I passed the counter yet again, there he was, having been found and returned by some obliging customer. In an instant, the arousal of terror spilled into ecstasy. Clutching my son, with tears suddenly flowing, I found myself unable to speak my thanks and stumbled out of the store awash in grateful joy.

Emotions are subjective. But they are real, says researcher Lisa Feldman Barrett (2012, 2013): “My experience of anger is not an illusion. When I’m angry, I feel angry. That’s real.” Where do our emotions come from? Why do we have them? What are they made of?

Emotions are our body’s adaptive response. They support our survival. When we face challenges, emotions focus our attention and energize our actions (Cyders & Smith, 2008). Our heart races. Our pace quickens. All our senses go on high alert. Receiving unexpected good news, we may find our eyes tearing up. We raise our hands triumphantly. We feel exuberance and a newfound confidence. Yet negative and prolonged emotions can harm our health.

Courtesy of David Myers

Emotion: Arousal, Behavior, and Cognition

41-1 How do arousal, expressive behavior, and cognition interact in emotion?

As my panicked search for Peter illustrates, **emotions** are a mix of

- *bodily arousal* (heart pounding),
- *expressive behaviors* (quickened pace), and
- *conscious experience* (“*Is this a kidnapping*?”) and feelings (panic, fear, joy).

emotion

a response of the whole organism, involving (1) physiological arousal, (2) expressive behaviors, and (3) conscious experience.

The puzzle for psychologists is figuring out how these three pieces fit together. To do that, the first researchers of emotion considered two big questions:

1. A chicken-and-egg debate: Does your bodily arousal come *before* or *after* your emotional feelings? (Did I first notice my racing heart and faster step, and then feel terror about losing Peter? Or did my sense of fear come first, stirring my heart and legs to respond?)
2. How do *thinking* (cognition) and *feeling* interact? Does cognition always come before emotion? (Did I think about a kidnapping threat before I reacted emotionally?)

Historical emotion theories, as well as current research, have sought to answer these questions.

Historical Emotion Theories

Flip It Video: Theories of Emotion

The psychological study of emotion began with the first question: How do bodily responses relate to emotions? Two famous theories offered different answers.

James-Lange Theory: Arousal Comes Before Emotion

Common sense tells most of us that we cry because we are sad, lash out because we are angry, tremble because we are afraid. First comes conscious awareness, then the feeling. But to pioneering psychologist William James, this commonsense view of emotion had things backward. Rather, “We feel sorry because we cry, angry because we strike, afraid because we tremble” (1890, p. 1066). To James, emotions result from attention to our bodily activity. James’ idea was also proposed by Danish physiologist Carl Lange, and so is called the **James-Lange theory**. James and Lange would have guessed that I noticed my racing heart and then, shaking with fright, felt the whoosh of emotion—that my feeling of fear *followed* my body’s response.

James-Lange theory

the theory that our experience of emotion is our awareness of our physiological responses to an emotion-arousing stimulus: stimulus → arousal → emotion.

FYI

Not only emotion, but most psychological phenomena (vision, sleep, memory, sex, and so forth) can be approached these three ways—physiologically, behaviorally, and cognitively.

Cannon-Bard Theory: Arousal and Emotion Occur Simultaneously

Physiologist Walter Cannon (1871–1945) disagreed with the James-Lange theory. Does a racing heart signal fear or anger or love? The body’s responses—heart rate, perspiration, and body temperature—are too similar, and they change too slowly, to *cause* the different emotions, said Cannon. He, and later another physiologist, Philip Bard, concluded that our bodily responses and experienced emotions occur separately but simultaneously. So, according to the **Cannon-Bard theory**, my heart began pounding *as* I experienced fear. The emotion-triggering stimulus traveled to my sympathetic nervous system, causing my body's arousal. *At the same time,* it traveled to my brain's cortex, causing my awareness of my emotion. My pounding heart did not cause my feeling of fear, nor did my feeling of fear cause my pounding heart.

Cannon-Bard theory

the theory that an emotion-arousing stimulus simultaneously triggers (1) physiological responses and (2) the subjective experience of emotion.

But are they really independent from each other? The Cannon-Bard theory has been challenged by studies of people with severed spinal cords, including a survey of 25 World War II soldiers (Hohmann, 1966). Those with *lower-spine injuries,* who had lost sensation only in their legs, reported little change in their emotions' intensity. Those with *high spinal cord injury,* who could feel nothing below the neck, did report changes. Some reactions were much less intense than before the injuries. Anger, one high spinal cord-injured man confessed, "just doesn't have the heat to it that it used to. It's a mental kind of anger." Other emotions, those expressed mostly in body areas above the neck, were felt more intensely. These men reported increases in weeping, lumps in the throat, and getting choked up when saying good-bye, worshiping, or watching a touching movie. Such evidence has led some researchers to view feelings as "mostly shadows" of our bodily responses and behaviors (Damasio, 2003). Brain activity underlies our emotions and our emotion-fed actions (Davidson & Begley, 2012).

Steve Pope/AP Photo

Joy expressed According to the James-Lange theory, we don’t just smile because we share our teammates’ joy. We also share the joy because we are smiling with them.

But our emotions also involve cognition (Averill, 1993; Barrett, 2006). Here we arrive at psychology’s second big emotion question: How do thinking and feeling interact? Whether we fear the man behind us on the dark street depends entirely on whether or not we interpret his actions as threatening.

AP® EXAM TIP

Be prepared for at least a multiple-choice question that tests your ability to compare and contrast the James-Lange, Cannon-Bard, and Schachter-Singer Two-Factor theories of emotion.

Schachter-Singer Two-Factor Theory: Arousal + Label = Emotion

41-2 To experience emotions, must we consciously interpret and label them?

Stanley Schachter and Jerome Singer (1962) demonstrated that how we *appraise* (interpret) our experiences also matters. Our physical reactions *and our thoughts* (perceptions, memories, and interpretations) together create emotion. In their **two-factor theory**, emotions have two ingredients: physical arousal and cognitive appraisal. An emotional experience, they argued, requires a conscious interpretation of arousal.

two-factor theory
the Schachter-Singer theory that to experience emotion one must (1) be physically aroused and (2) cognitively label the arousal.

Consider how arousal spills over from one event to the next. Imagine arriving home after an invigorating run and finding a message that you got a longed-for college acceptance letter. With arousal lingering from the run, would you feel more elated than if you heard this news after staying awake all night studying?

To explore this *spillover effect,* Schachter and Singer injected college men with the hormone epinephrine, which the trickster researchers told the men would help test their eyesight. In reality, the drug triggers feelings of arousal. Picture yourself as a participant: After receiving the injection, you go to a waiting room, where you find yourself with another person (actually an accomplice of the experimenters) who is acting either euphoric or irritated. As you observe this person, you begin to feel your heart race, your body flush, and your breathing become more rapid. If you had been told to expect these effects from the injection, what would you feel? The actual volunteers felt little emotion—because they attributed their arousal to the drug. But if you had been told the injection would produce no arousal, what would you feel? Perhaps you would react as another group of participants did. They “caught” the apparent emotion of the other person in the waiting room. They became happy if the accomplice was acting euphoric, and testy if the accomplice was acting irritated.

OLEG POPOV/REUTERS/Newscom

The spillover effect Arousal from a soccer match can fuel anger, which can descend into rioting or other violent confrontations.

This discovery—that a stirred-up state can be experienced as one emotion or another, depending on how we interpret and label it—has been replicated in dozens of experiments and continues to influence modern emotion research (MacCormack & Lindquist, 2016; Reisenzein, 1983; Sinclair et al., 1994).

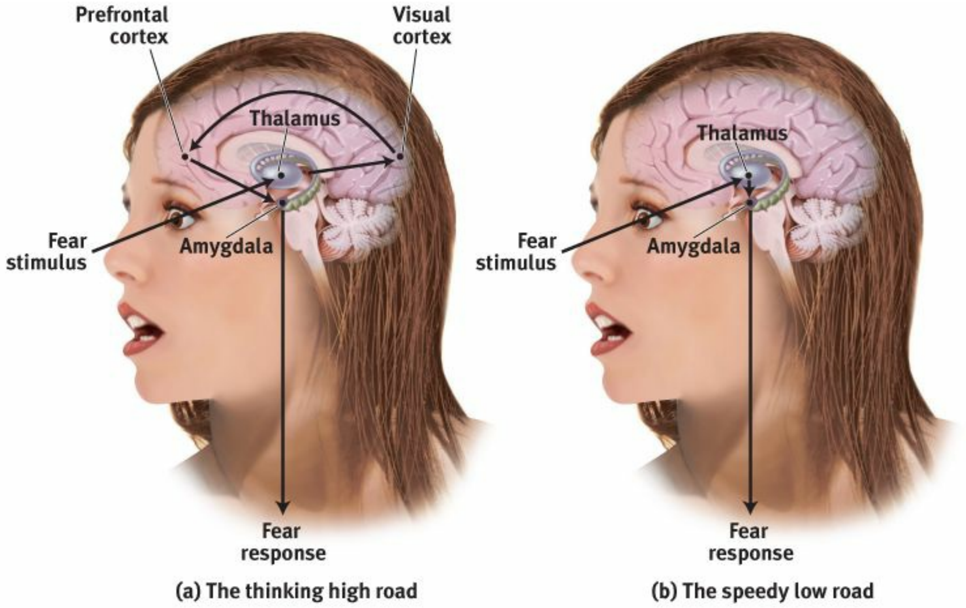
The point to remember: Arousal fuels emotion; cognition channels it.

Zajonc, LeDoux, and Lazarus: Does Cognition Always Precede Emotion?

But is the heart always subject to the mind? Must we *always* interpret our arousal before we can experience an emotion? Robert Zajonc [ZI-yence] (1923–2008) didn't think so. He contended that we actually have many emotional reactions apart from, or even before, our conscious interpretation of a situation (1980, 1984a). Perhaps you can recall liking something or someone immediately, without knowing why.

Even when people repeatedly view stimuli flashed too briefly for them to interpret, they come to prefer those stimuli (Kunst-Wilson & Zajonc, 1980). Unaware of having previously seen them, they nevertheless like them. We also have an acutely sensitive automatic radar for emotionally significant information, such that even a subliminally flashed stimulus can prime us to feel better or worse about a follow-up stimulus (Murphy et al., 1995; Zeelenberg et al., 2006).

Neuroscientists are charting the neural pathways of emotions (Ochsner et al., 2009). Our emotional responses can follow two different brain pathways. Some emotions (especially more complex feelings like hatred and love) travel a “high road.” A stimulus following this path would travel (by way of the thalamus) to the brain’s cortex (**Figure 41.1a**). There, it would be analyzed and labeled before the response command is sent out, via the amygdala (an emotion-control center).



(a) The thinking high road

(b) The speedy low road

Figure 41.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 41.1 The brain’s pathways for emotions

In the two-track brain, sensory input may be routed (a) to the cortex (via the thalamus) for analysis and then transmission to the amygdala, or (b) directly to the amygdala (via the thalamus) for an instant emotional reaction.

But sometimes our emotions (especially simple likes, dislikes, and fears) take what Joseph LeDoux (2002, 2015) has called the more direct “low road,” a neural shortcut that bypasses the cortex. Following the low road, a fear-provoking stimulus would travel from the eye or ear (again via the thalamus) directly to the amygdala (Figure 41.1b). This shortcut enables our greased-lightning emotional response before our intellect intervenes. Like speedy reflexes (that also operate separately from the brain's thinking cortex), the amygdala reactions are so fast that we may be unaware of what's transpired (Dimberg et al., 2000). A conscious feeling of fear then occurs as we become aware that our brain has detected danger.

The amygdala sends more neural projections up to the cortex than it receives back, which makes it easier for our feelings to hijack our thinking than for our thinking to rule our feelings (LeDoux & Armony, 1999). Thus, in the forest, we can jump at the sound of rustling bushes nearby, leaving it to our cortex to decide later whether the sound was made by a snake or by the wind. Such experiences support Zajonc's and LeDoux's belief that *some* of our emotional reactions involve no deliberate thinking.

Emotion researcher Richard Lazarus (1991, 1998) conceded that our brain processes vast amounts of information without our conscious awareness, and that some emotional responses do not require *conscious* thinking. Much of our emotional life operates via the automatic, speedy low road. But he wondered: How would we *know* what we are reacting to if we did not in some way appraise the situation? The appraisal may be effortless and we may not be conscious of it, but it is still a mental function. To know whether a stimulus is good or bad, the brain must have some idea of what it is (Storbeck et al., 2006). Thus, said Lazarus, emotions arise when we *appraise* an event as harmless or dangerous. We appraise the sound of the rustling bushes as the presence of a threat. Later, we realize that it was "just the wind."

So, let's sum up (see also **Table 41.1**). As Zajonc and LeDoux have demonstrated, some emotional responses—especially simple likes, dislikes, and fears—involve no conscious thinking (**Figure 41.2**). When I [ND] see a big spider trapped behind glass, I experience fear, even though I *know* the spider can't hurt me. Such responses are difficult to alter by changing our thinking. Within a fraction of a second, we may perceive one person as more likable or trustworthy than another (Willis & Todorov, 2006). This instant appeal can even influence our political decisions if we vote (as many people do) for a candidate we *like* over the candidate who expresses positions closer to our own (Westen, 2007).

TABLE 41.1 Summary of Emotion Theories

Theory	**Explanation of Emotions**	**Example**
James-Lange	Emotions arise from our awareness of our bodily responses to emotion-arousing stimuli: stimuli → arousal → emotion.	We observe our heart racing after a threat and then feel afraid.
Cannon-Bard	Emotion-arousing stimuli trigger our bodily responses and simultaneous subjective experience.	Our heart races at the same time that we feel afraid.
Schachter-Singer	Our experience of emotion depends on two factors: general arousal and a conscious cognitive label.	We may interpret our arousal as fear or excitement, depending on the context.
Zajonc; LeDoux	Some embodied responses happen instantly, without conscious appraisal.	We automatically feel startled by a sound in the forest before labeling it as a threat.
Lazarus	Cognitive appraisal (“Is it dangerous or not?”)—sometimes without our awareness—defines emotion.	The sound is “just the wind.”

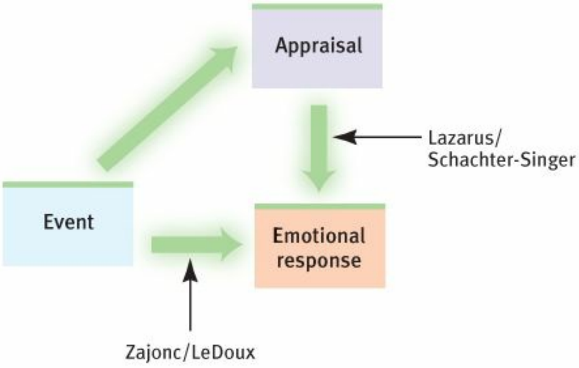


Figure 41.2
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 41.2 **Two pathways for emotions**

Zajonc and LeDoux emphasized that some emotional responses are immediate, before any conscious appraisal. Lazarus, Schachter, and Singer emphasized that our appraisal and labeling of events also determine our emotional responses.

AP® EXAM TIP

Table 41.1 summarizes the theories of emotion. They are presented in their order of appearance historically. Notice that cognition, an important factor in the modern theories, is not mentioned in the first two theories.

But other emotions—including depressive moods and complex feelings such as hatred and love—are greatly affected by our conscious and unconscious information processing: our memories, expectations, and interpretations. For these emotions, we have more conscious control. When we feel emotionally overwhelmed, we can change our interpretations (Gross, 2013). Such *reappraisal* often reduces distress and the corresponding amygdala response (Buhle et al., 2014; Denny et al., 2015). Reappraisal not only reduces stress, it also helps students achieve higher test scores (Jamieson et al., 2016). Don’t stress about your stress. Embrace it, and approach your next test with the mindset, “Stress evolved to help maintain my focus and solve problems.” Although the emotional low road functions automatically, the thinking high road allows us to retake some control over our emotional life. *The bottom line:* Together, automatic emotion and conscious thinking weave the fabric of our emotional lives.

Check Your Understanding

Ask Yourself

- Can you remember a time when you began to feel upset or uneasy and only later labeled those feelings?

Test Yourself

- According to the Cannon-Bard theory, (a) our *physiological response* to a stimulus (for example, a pounding heart) and (b) the *emotion* we experience (for example, fear) occur _______________ (simultaneously/sequentially).

According to the James-Lange theory, (a) and (b) occur _______________ (simultaneously/sequentially).

- According to Schachter and Singer, two factors lead to our experience of an emotion: (1) physiological arousal and (2) _______________ appraisal.
- Emotion researchers have disagreed about whether emotional responses occur in the absence of cognitive processing. How would you characterize the approach of each of the following researchers: Zajonc, LeDoux, Lazarus, Schachter, and Singer?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

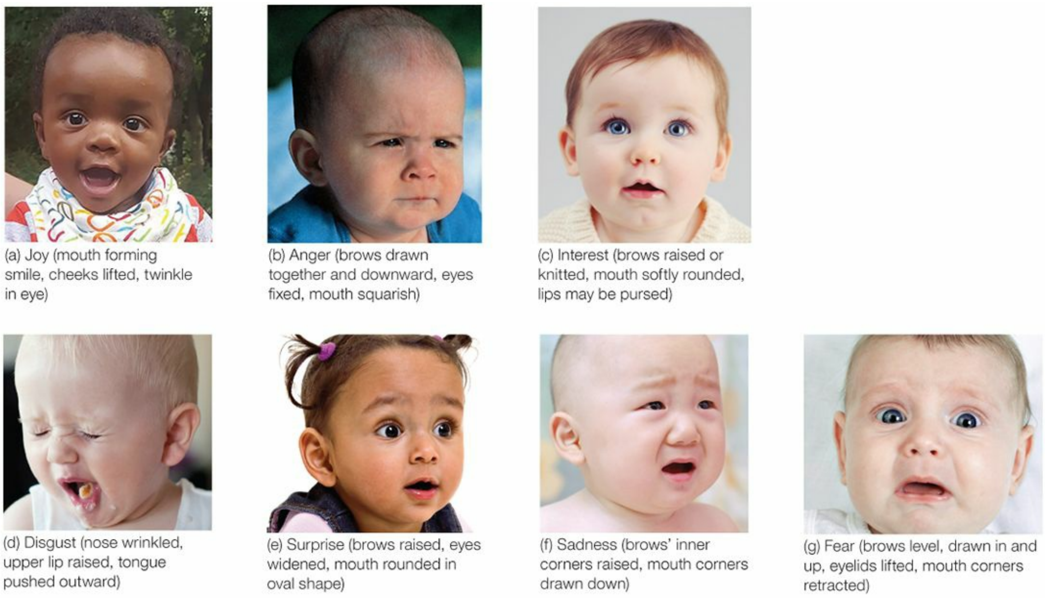
Embodied Emotion

Whether you are falling in love or grieving a death, you need little convincing that emotions involve the body. Feeling without a body is like breathing without lungs. Some physical responses are easy to notice. Other emotional responses we experience without awareness.

The Basic Emotions

41-3 What are the basic emotions, and what is the link between emotional arousal and the autonomic nervous system?

How many distinct emotions are there? When surveyed, most emotion scientists agreed that anger, fear, disgust, sadness, and happiness are basic human emotions (Ekman, 2016). Carroll Izard (1977) isolated 10 basic emotions (joy, interest-excitement, surprise, sadness, anger, disgust, contempt, fear, shame, and guilt), most present in infancy (**Figure 41.3**). Others believe that pride and love are also basic emotions (Shaver et al., 1996; Tracy & Robins, 2004). But Izard has argued that other emotions are combinations of these 10, with love, for example, being a mixture of joy and interest-excitement.



(a) Joy (mouth forming smile, cheeks lifted, twinkle in eye)

(b) Anger (brows drawn together and downward, eyes fixed, mouth squarish)

(c) Interest (brows raised or knitted, mouth softly rounded, lips may be pursed)

(d) Disgust (nose wrinkled, upper lip raised, tongue pushed outward)

(e) Surprise (brows raised, eyes widened, mouth rounded in oval shape)

(f) Sadness (brows' inner corners raised, mouth corners drawn down)

(g) Fear (brows level, drawn in and up, eyelids lifted, mouth corners retracted)

Figure 41.1
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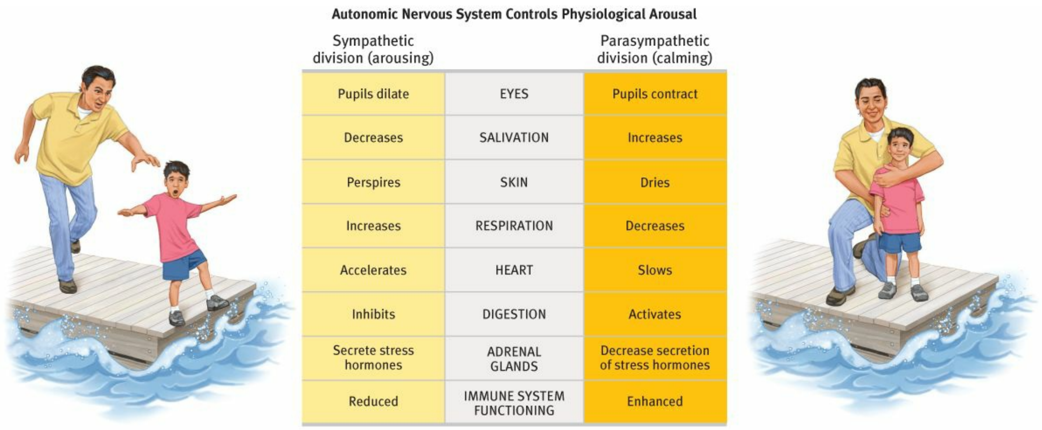
(a) Lorie Hailev: (b) Patrick Donehue/Science Source: (c) © Emma Kim/cultura/Corbis; (d) lina aidukaite/Getty Images; (e) Samuel Borges Photography /Shutterstock; (f) bendao/Getty Images; (g) Vladimir Godnik/Getty Images

Figure 41.3 Some naturally occurring infant emotions

To identify the emotions generally present in infancy, Carroll Izard analyzed the facial expressions of infants.

Emotions and the Autonomic Nervous System

As we saw in Module 10, in a crisis the *sympathetic division* of your *autonomic nervous system (ANS)* mobilizes your body for action (**Figure 41.4**). It directs your adrenal glands to release the stress hormones *epinephrine (adrenaline)* and *norepinephrine (noradrenaline)*. To provide energy, your liver pours extra sugar into your bloodstream. To help burn the sugar, your respiration increases to supply needed oxygen. Your heart rate and blood pressure increase. Your digestion slows, diverting blood from your internal organs to your muscles. With blood sugar driven into the large muscles, running becomes easier. Your pupils dilate, letting in more light. To cool your stirred-up body, you perspire. If wounded, your blood would clot more quickly.



Autonomic Nervous System Controls Physiological Arousal

Sympathetic division (arousing)		Parasympathetic division (calming)
Pupils dilate	EYES	Pupils contract
Decreases	SALIVATION	Increases
Perspires	SKIN	Dries
Increases	RESPIRATION	Decreases
Accelerates	HEART	Slows
Inhibits	DIGESTION	Activates
Secrete stress hormones	ADRENAL GLANDS	Decrease secretion of stress hormones
Reduced	IMMUNE SYSTEM FUNCTIONING	Enhanced

Figure 41.4

Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 41.4 Emotional arousal

Like a crisis control center, the autonomic nervous system arouses the body in a crisis and calms it when danger passes.

When the crisis passes, the *parasympathetic division* of your ANS gradually calms your body, as stress hormones slowly leave your bloodstream. After your next crisis, think of this: Without any conscious effort, your body's response to danger is wonderfully coordinated and adaptive—preparing you to *fight* or *flee.* So, do the different emotions have distinct arousal fingerprints?

The Physiology of Emotions

41-4 Do different emotions activate different physiological and brain-pattern responses?

Imagine conducting an experiment measuring the physiological responses of emotion. In each of four rooms, you have someone watch a movie: In the first, the person views a horror film; in the second, an anger-provoking film; in the third, a sexually arousing film; in the fourth, a boring film. From the control center, you monitor each person's perspiration, pupil size, breathing, and heart rate. Could you tell who is frightened? Who is angry? Who is sexually aroused? Who is bored?

AP® EXAM TIP

Figure 41.4 compares and contrasts the sympathetic and parasympathetic nervous systems. On the AP® exam you may need to be able to identify which physiological effects occur with each division.

With training, you could probably pick out the bored viewer. But discerning physiological differences among fear, anger, and sexual arousal is much more difficult (Barrett, 2006). Different emotions can share common biological signatures.

A single brain region can also serve as the seat of seemingly different emotions. Consider the broad emotional portfolio of the *insula*, a neural center deep inside the brain. The insula is activated when we experience various negative social emotions, such as lust, pride, and disgust. In brain scans, it becomes active when people bite into some disgusting food, smell disgusting food, think about biting into a disgusting cockroach, or feel moral disgust over a sleazy business exploiting a saintly widow (Sapolsky, 2010). Similar multitasking regions are found in other brain areas.

> “*No one ever told me that grief felt so much like fear. I am not afraid, but the sensation is like being afraid. The same fluttering in the stomach, the same restlessness, the yawning. I keep on swallowing.*”
>
> *C. S. Lewis, A Grief Observed, 1961*

Yet our varying emotions *feel* different to us, and they often *look* different to others. We may appear “paralyzed with fear” or “ready to explode.” Fear and joy prompt a similar increased heart rate, but they stimulate different facial muscles. During fear, your brow muscles tense. During joy, muscles in your cheeks and under your eyes pull into a smile (Witvliet & Vrana, 1995).

Some of our emotions also have distinct brain circuits (Panksepp, 2007). Observers watching fearful faces showed more amygdala activity than did other observers who watched angry faces (Whalen et al., 2001). Brain scans and EEG recordings show that emotions also activate different areas of the brain's cortex. When you experience negative emotions such as disgust, your right prefrontal cortex tends to be more active than the left. Depression-prone people, and those with generally negative perspectives, have also shown more right frontal lobe activity (Harmon-Jones et al., 2002).

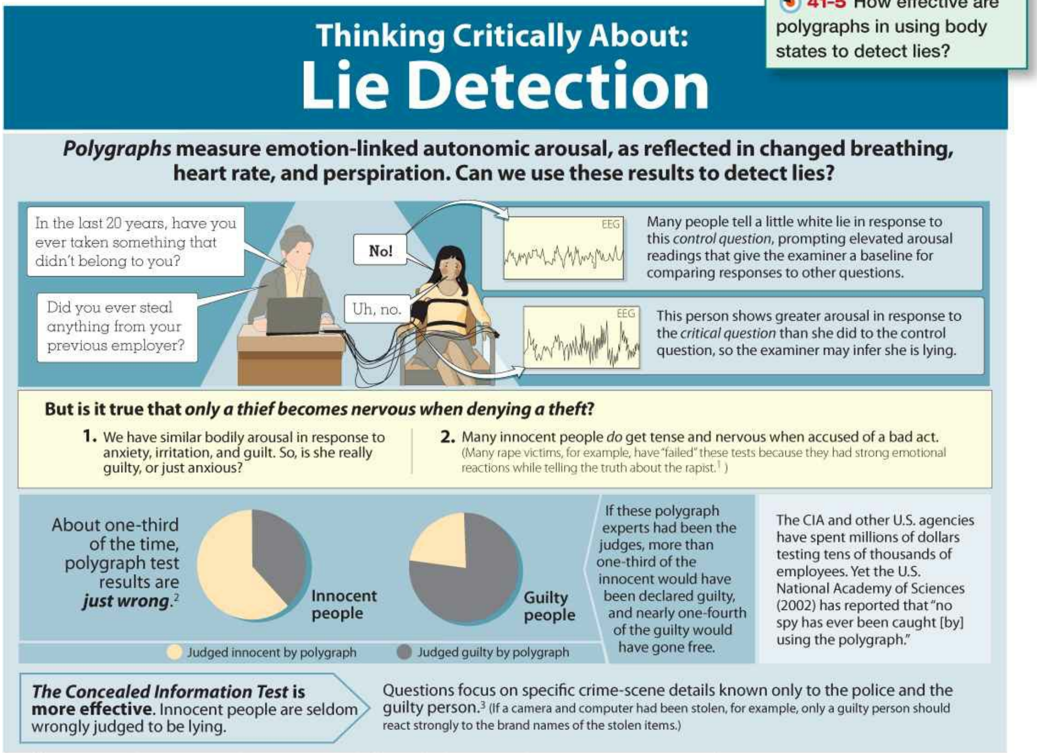
Gary Dobner/Alamy

Scary thrills Elated excitement and panicky fear involve similar physiological arousal. That allows us to flip rapidly between the two emotions.

Positive moods tend to trigger more left frontal lobe activity. People with positive personalities—exuberant infants and alert, energized, and persistently goal-directed adults—have also shown more activity in the left frontal lobe than in the right (Davidson, 2000; Urry et al., 2004). Indeed, the more a person's baseline frontal lobe activity tilts left—or is made to tilt left by perceptual activity—the more upbeat the person typically is (Drake & Myers, 2006).

To sum up, we can't easily see differences in emotions from tracking heart rate, breathing, and perspiration. But facial expressions and brain activity can vary with the emotion. So, do we, like Pinocchio, give off telltale signs when we lie? For more on that question, see Thinking Critically About: Lie Detection.

41-5 How effective are polygraphs in using body states to detect lies?


In the last 20 years, have you ever taken something that didn't belong to you?
No!
Did you ever steal anything from your previous employer?
Uh, no.
EEG
EEG
Innocent people
Guilty people
🟨 Judged innocent by polygraph
● Judged guilty by polygraph

Thinking Critically About:

Lie Detection

***Polygraphs* measure emotion-linked autonomic arousal, as reflected in changed breathing, heart rate, and perspiration. Can we use these results to detect lies?**

Many people tell a little white lie in response to this *control question*, prompting elevated arousal readings that give the examiner a baseline for comparing responses to other questions.

This person shows greater arousal in response to the *critical question* than she did to the control question, so the examiner may infer she is lying.

But is it true that *only a thief becomes nervous when denying a theft?*

1. We have similar bodily arousal in response to anxiety, irritation, and guilt. So, is she really guilty, or just anxious?
2. Many innocent people *do* get tense and nervous when accused of a bad act. (Many rape victims, for example, have "failed" these tests because they had strong emotional reactions while telling the truth about the rapist.[1])

About one-third of the time, polygraph test results are ***just wrong***.[2]

If these polygraph experts had been the judges, more than one-third of the innocent would have been declared guilty, and nearly one-fourth of the guilty would have gone free.

The CIA and other U.S. agencies have spent millions of dollars testing tens of thousands of employees. Yet the U.S. National Academy of Sciences (2002) has reported that "no spy has ever been caught [by] using the polygraph."

***The Concealed Information Test* is more effective.** Innocent people are seldom wrongly judged to be lying.

Questions focus on specific crime-scene details known only to the police and the guilty person.[3] (If a camera and computer had been stolen, for example, only a guilty person should react strongly to the brand names of the stolen items.)

1. Lykken, 1991. 2. Kleinmuntz & Szucko, 1984. 3. Ben-Shakhar & Elaad, 2003; Verschuere & Meijer, 2014; Vrij & Fisher, 2016.

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polygraph

a machine used in attempts to detect lies that measures several of the physiological responses (such as perspiration, heart rate, and breathing changes) accompanying emotion.

✓ Check Your Understanding

Ask Yourself

- Can you think of a recent time when you noticed your body's reactions to an emotionally charged situation, such as a difficult social setting, or perhaps a test or game you had been worrying about in advance? How would you describe your sympathetic nervous system's responses?

Test Yourself

- How do the two divisions of the autonomic nervous system affect our emotional responses?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 41 REVIEW

41-1 How do arousal, expressive behavior, and cognition interact in emotion?

- *Emotions* are psychological responses of the whole organism involving an interplay among physiological arousal, expressive behaviors, and conscious experience.
- Theories of emotion generally address two major questions: (1) Does physiological arousal come before or after emotional feelings, and (2) how do cognition and feeling interact?
- The *James-Lange theory* maintains that emotional feelings follow our body's response to emotion-inducing stimuli. (We observe our heart pounding and feel fear.)
- The *Cannon-Bard theory* proposes that our body responds to emotion at the same time that we experience the emotion (one does not cause the other).

41-2 To experience emotions, must we consciously interpret and label them?

- The Schachter-Singer *two-factor theory* holds that our emotions have two ingredients, physical arousal and a cognitive label, and the cognitive labels we put on our states of arousal are an essential ingredient of emotion.
- Lazarus agreed that many important emotions arise from our inferences. Zajonc and LeDoux, however, have contended that some simple emotional responses occur instantly, not only outside our conscious awareness but before any cognitive processing occurs. This interplay between emotion and cognition illustrates our two-track mind.

41-3 What are the basic emotions, and what is the link between

emotional arousal and the autonomic nervous system?

- Caroll Izard's 10 basic emotions are joy, interest/excitement, surprise, sadness, anger, disgust, contempt, fear, shame, and guilt.
- The arousal component of emotion is regulated by the autonomic nervous system's sympathetic (arousing) and parasympathetic (calming) divisions.
- In a crisis, the fight-or-flight response automatically mobilizes your body for action.

41-4 Do different emotions activate different physiological and brain-pattern responses?

- The large-scale body changes that accompany fear, and anger, and sexual arousal are very similar (increased perspiration, breathing, and heart rate), though they feel different. Emotions may be similarly arousing, but some subtle physiological responses, such as facial muscle movements, distinguish them.
- More meaningful differences have been found in activity in some brain pathways and cortical areas.

41-5 How effective are polygraphs in using body states to detect lies?

- *Polygraphs*, which measure several physiological indicators of emotion, are not accurate enough to justify widespread use in business and law enforcement. The use of the Concealed Information Test and new forms of technology may produce better indications of lying.

Multiple-Choice Questions

1. One night Samar became frightened when she was startled by a noise while walking down the street alone. Which theory of emotion would say that her fear resulted from the startle response alone?

a. James-Lange
b. Cannon-Bard
c. Two-factor
d. Lazarus’
e. Schachter-Singer’s

2. The Cannon-Bard theory of emotion states that

a. emotional response occurs before cognition.
b. physiological response occurs before emotional response.
c. emotional response occurs before physiological response.
d. cognition occurs before emotional response.
e. physiological response and emotion occur independently and simultaneously.

3. Which of the following is an example of cognitive appraisal?

a. Randall is happy all day because he is savoring the wonderful events of yesterday.
b. Charles is frightened in a dark alley because he remembers stories of others being attacked in dark alleys.
c. Sherika labels the arousal she is feeling as attraction because she is in the presence of a good-looking man.
d. Dora is angry because she cannot figure out how to convince her husband to take her to Hawaii.
e. Ann is frustrated because traffic has made her late for an important meeting.

4. Which of the following characterizes the “low road” neural pathway to emotions?

a. Information travels directly from the thalamus to the amygdala.
b. The emotional response happens more slowly than it would via the “high road.”
c. It is an example of top-down processing.
d. It is more likely to be utilized for complex feelings.
e. It passes through the brain’s cortex.

Practice FRQs

1. Roger is about to ride a roller coaster. He is afraid of heights and is nervous about the ride. How would each of the following theories explain Roger’s experience of fear on the roller coaster?

- James-Lange
- Cannon-Bard
- Schachter-Singer

Answer

1 point: The James-Lange theory would explain Roger’s fear as happening *after* he notices that his heart is pounding (or any other physiological response to the stress of riding a roller coaster.) Page 433

1 point: The Cannon-Bard theory would describe Roger’s fear as occurring *at the same time* that he feels his heart pound (or any other physiological response to the stress of riding a roller coaster.) Page 433

1 point: The Schachter-Singer theory would explain Roger’s fear as a result of a cognitive appraisal of his pounding heart (or any other physiological response to the stress of riding a roller coaster) that he would then label as fear. Page 434

2. Lynn’s boyfriend has not replied to her last three texts. Lynn is experiencing anger, increased blood pressure, and rapid breathing. Analyze this situation using the James-Lange, Cannon-Bard, and Lazarus theories of emotion.

(3 points)

Module 42 Expressing Emotion

LEARNING TARGETS

- 42-1 Describe our ability to communicate nonverbally.
- 42-2 Discuss how the genders differ in their ability to communicate nonverbally.
- 42-3 Discuss culture-specific and culturally universal gestures and facial expressions.
- 42-4 Explain how our facial expressions influence our feelings.

Expressive behavior implies emotion. Dolphins, with smiles seemingly plastered on their faces, appear happy. To decipher people’s emotions we read their bodies, listen to their voice tones, and study their faces. Does nonverbal language vary with culture—or is it universal? And do our expressions influence our experienced emotions?

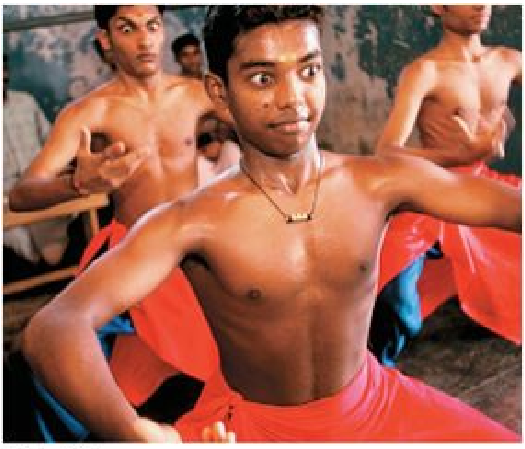
Detecting Emotion in Others

42-1 How do we communicate nonverbally?

To Westerners, a firm handshake conveys an outgoing, expressive personality (Chaplin et al., 2000). A glance can communicate intimacy, while darting eyes may signal anxiety (Kleinke, 1986; Perkins et al., 2012). When two people are passionately in love, they typically spend time—quite a bit of time—gazing into each other's eyes (Bolmont et al., 2014; Rubin, 1970). Would such gazes stir these feelings between strangers? To find out, researchers have asked unacquainted male-female (and presumed heterosexual) pairs to gaze intently for 2 minutes either at each other's hands or into each other's eyes. After separating, the eye gazers reported feeling a tingle of attraction and affection (Kellerman et al., 1989).

> “*Your face, my thane, is a book where men may read strange matters.*”
>
> *Lady Macbeth to her husband, in William Shakespeare's Macbeth*

Our brain is an amazing detector of subtle expressions, helping most of us read nonverbal cues well. We are adept at detecting a hint of a smile (Maher et al., 2014). Shown 10 seconds of video from the end of a speed-dating interaction, people can often tell whether one person is attracted to another (Place et al., 2009). Signs of status are also easy to spot. When shown someone with arms raised, chest expanded, and a slight smile, people—from Canadian undergraduates to Fijian villagers—perceive that person as experiencing pride and having high status (Tracy et al., 2013). Even glimpsing a face for one-tenth of a second has enabled viewers to judge people's attractiveness or trustworthiness, or to rate politicians' competence and predict their voter support (Willis & Todorov, 2006). “First impressions . . . occur with astonishing speed,” note Christopher Olivola and Alexander Todorov (2010).



Ruby/Alamy

A silent language of emotion Hindu classic dance uses the face and body to effectively convey 10 different emotions (Hejmadi et al., 2000).

We also excel at detecting nonverbal threats. We readily sense subliminally presented negative words, such as *snake* or *bomb* (Dijksterhuis & Aarts, 2003). A single angry face will “pop out” of a crowd (Pinkham et al., 2010). Experience can sensitize us to particular emotions, as shown by experiments using a series of faces (like those in **Figure 42.1**) that morph from anger to fear (or sadness). Viewing such faces, physically abused children are much quicker than other children to spot the signals of anger. Shown a face that is 50 percent fear and 50 percent anger, they are more likely to perceive anger than fear. Their perceptions become sensitively attuned to glimmers of danger that nonabused children miss.

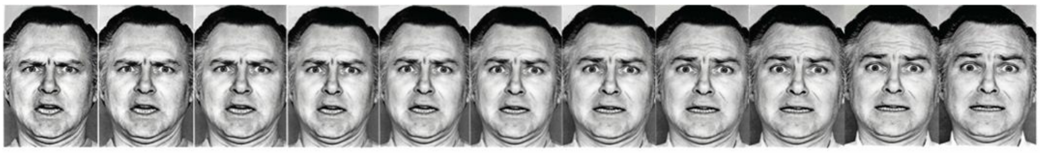


Figure 42.1

Paul Ekman, Ph.D./Paul Ekman Group, LLC.

Figure 42.1 Experience influences how we perceive emotions

Viewing the morphed middle face, evenly mixing anger with fear, physically abused children were more likely than nonabused children to perceive the face as angry (Pollak & Kistler, 2002; Pollak & Tolley-Schell, 2003).

Hard-to-control facial muscles can reveal emotions you may be trying to conceal. Lifting just the inner part of your eyebrows, which few people do consciously, reveals distress or worry. Eyebrows raised and pulled together signal fear. Raised cheeks and activated muscles under the eyes suggest a natural smile, called a *Duchenne smile* (in honor of the French physician who described it). A feigned smile, such as one we make for a photographer, is often frozen in place for several seconds, then suddenly switched off (**Figure 42.2**). Genuine happy smiles tend to be briefer and to fade less abruptly (Bugental, 1986). If you have the urge to hide your happiness, remember that genuine smiles cause others to perceive us as trustworthy, authentic, and attractive (Gunnery & Ruben, 2016). Let your smile shine.

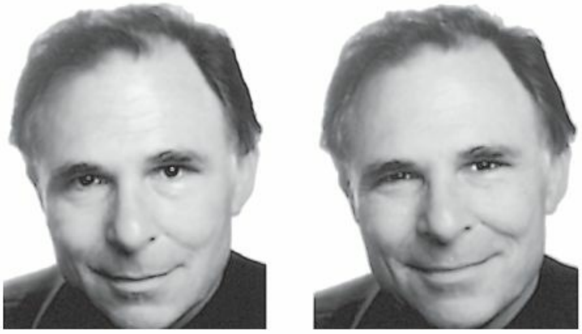


Figure 42.2
Paul Ekman, Ph.D./Paul Ekman Group, LLC.

Figure 42.2 Which of researcher Paul Ekman's smiles is feigned, which natural?

The smile on the right engages the facial muscles of a natural smile.

Despite our brain's emotion-detecting skill, we find it difficult to discern deceit. The behavioral differences between liars and truth tellers are too minute for most people to detect (Hartwig & Bond, 2011). In one digest of 206 studies, people were just 54 percent accurate in discerning truth from lies—barely better than a coin toss (Bond & DePaulo, 2006). Moreover, virtually no one—save perhaps police professionals in high-stakes situations—beats chance by much (Bond & DePaulo, 2008; O'Sullivan et al., 2009).

Some of us more than others are sensitive to the physical cues of various emotions. In one study, people named the emotion displayed in brief film clips. The clips showed portions of a person’s emotionally expressive face or body, sometimes accompanied by a garbled voice (Rosenthal et al., 1979). For example, after a 2-second scene revealing only the face of an upset woman, the researchers would ask whether the woman was criticizing someone for being late or was talking about her divorce. Given such “thin slices,” some people were much better emotion detectors than others. Introverts tend to excel at reading others’ emotions, while extraverts are generally easier to read (Ambady et al., 1995).

Gestures, facial expressions, and voice tones, which are absent in written communication, convey important information. The difference was clear when study participants in one group heard 30-second recordings of people describing their marital separations. Participants in the other group read a script of the recording. Those who *heard* the recording were better able to predict the people’s current and future adjustment (Mason et al., 2010). Just hearing a stranger say “hello” is enough to give listeners some clue to the speaker’s personality.

The absence of expressive emotion can make for ambiguous emotion in electronic communications. To partly remedy that, we often embed visual cues to emotion in our messages 🙂. Without the vocal nuances that signal whether our statement is serious, kidding, or sarcastic, we are in danger of what developmental psychologist Jean Piaget called *egocentrism,* by failing to perceive how others interpret our “just kidding” message (Kruger et al., 2005).

Gender, Emotion, and Nonverbal Behavior

42-2 How do the genders differ in their ability to communicate nonverbally?

Is women’s intuition superior to men’s, as so many people believe (Gigerenzer et al., 2014)? Do women have greater sensitivity than men to nonverbal cues? After analyzing 125 studies, Judith Hall (1984, 1987) concluded that, when given thin slices of behavior, women generally do surpass men at reading people’s emotional cues. The female advantage emerges early in development. Female infants, children, and adolescents have outperformed males in many studies (McClure, 2000). Women’s nonverbal sensitivity helps explain their greater emotional literacy. When invited to describe how they would feel in certain situations, men tend to describe simpler emotional reactions (Barrett et al., 2000). You might like to try this yourself: Ask some people how they might feel when saying good-bye to friends after graduating from high school. Research suggests you will be more likely to hear young men say, simply, “I’ll feel bad,” and to hear young women to express more complex emotions: “It will be bittersweet; I’ll feel both happy and sad.”

Women’s skill at decoding others’ emotions may also contribute to their greater emotional responsiveness and expressiveness (Fischer & LaFrance, 2015; Vigil, 2009). In studies of 23,000 people from 26 cultures, women more than men reported themselves open to feelings (Costa et al., 2001). Girls also express stronger emotions than boys do, hence the extremely strong perception that emotionality is “more true of women”—a perception expressed by nearly 100 percent of 18- to 29-year-old Americans (Chaplin & Aldao, 2013; Newport, 2001).

One exception: Quickly—imagine an angry face. What gender is the person? If you’re like 3 in 4 Arizona State University students, you imagined a male (Becker et al., 2007). And when a gender-neutral face was made to look angry, most people perceived it as male. If the face was smiling, they were more likely to perceive it as female (**Figure 42.3**). Anger strikes most people as a more masculine emotion.

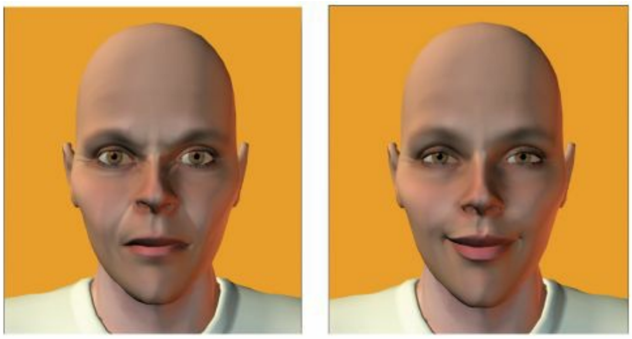


Figure 42.3
Vaughn Becker/© APA

Figure 42.3 Male or female?

Researchers manipulated a gender-neutral face. People were more likely to see it as male when it wore an angry expression and female when it wore a smile (Becker et al., 2007).

The perception of women's emotionality also feeds—and is fed by—people's attributing women's emotionality to their disposition and men's to their circumstances: "She's emotional. He's having a bad day" (Barrett & Bliss-Moreau, 2009). Many factors influence our attributions, including cultural norms (Mason & Morris, 2010). Nevertheless, there are some gender differences in descriptions of emotional experiences. When surveyed, women are also far more likely than men to describe themselves as empathic. If you have *empathy*, you identify with others and appraise a situation as they do, rejoicing with those who rejoice and weeping with those who weep (Wondra & Ellsworth, 2015). Fiction readers, who immerse themselves in the lives of their favorite characters, report higher empathy levels (Mar et al., 2009). This may help explain why, compared with men, women read more fiction (Tepper, 2000). But physiological measures, such as heart rate while seeing another's distress, reveal a much smaller gender gap (Eisenberg & Lennon, 1983; Rueckert et al., 2010).

Females are also more likely to *express* empathy—to display more emotion when observing someone else's emotions. As **Figure 42.4** shows, this gender difference was clear when male and female students watched film clips that were sad (children with a dying parent), happy (slapstick comedy), or frightening (a man nearly falling off the ledge of a tall building) (Kring & Gordon, 1998). Women also tend to experience emotional events, such as viewing pictures of mutilation, more deeply and with more brain activation in areas sensitive to emotion. And they better remember the scenes three weeks later (Canli et al., 2002).

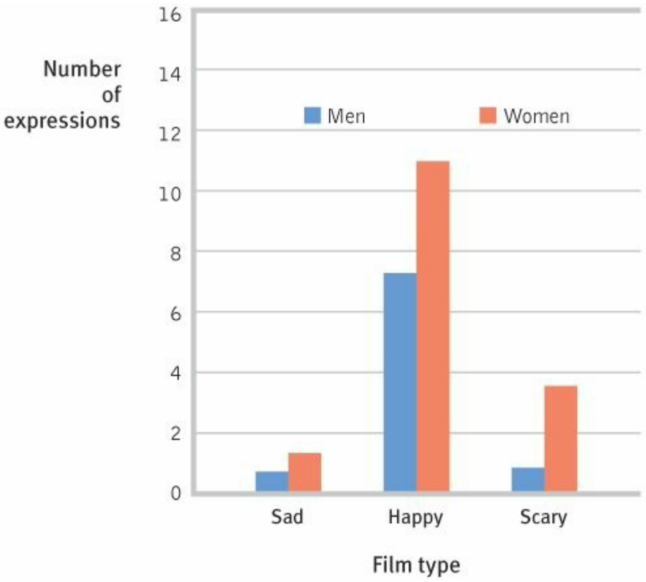


Figure 42.4
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Kring & Gordon, 1998.

Figure 42.4 Gender and expressiveness

Male and female film viewers did not differ dramatically in self-reported emotions or physiological responses. But the women's faces *showed* much more emotion.

Culture and Emotional Expression

42-3 How are gestures and facial expressions understood within and across cultures?

The meaning of *gestures* varies with the culture. U.S. President Richard Nixon learned this after making the North American “A-OK” sign before a welcoming crowd of Brazilians, not realizing it was a crude insult in that country. The importance of cultural definitions of gestures and other body language was again demonstrated in 1968, when North Korea publicized photos of supposedly happy officers from a captured U.S. Navy spy ship. In the photo, three men had raised their middle finger, telling their captors it was a “Hawaiian good luck sign” (Fleming & Scott, 1991).

Do *facial expressions* also have different meanings in different cultures? To find out, two investigative teams showed photographs of various facial expressions to people in different parts of the world and asked them to guess the emotion (Ekman, 1994, 2016; Izard, 1977, 1994). You can try this matching task yourself by pairing the six emotions with the six faces in **Figure 42.5**.

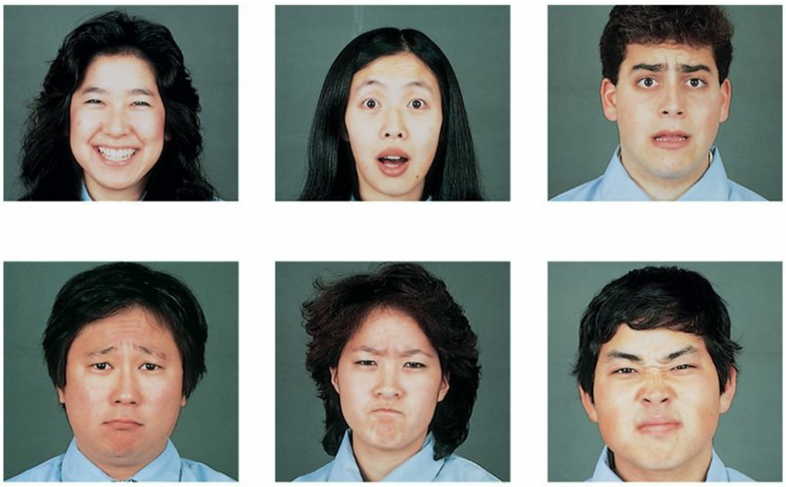


Figure 42.5
Ekman & Matsumoto, Japanese and Caucasian Facial Expressions of Emotions

Figure 42.5 Culture-specific or culturally universal expressions?

As people of differing cultures, do our faces speak differing languages? Which face expresses disgust? Anger? Fear? Happiness?

Sadness? Surprise? (From Matsumoto & Ekman, 1989.)[1]

Regardless of your cultural background, you probably did pretty well. A smile’s a smile the world around. Ditto for sadness. Other emotional expressions are less universally recognized (Crivelli et al., 2016a; Jack et al., 2012). But there is no culture where people frown when they are happy.

Facial expressions do convey some nonverbal accents that provide clues to one’s culture (Crivelli et al., 2016b; Marsh et al., 2003). Thus, data from 182 studies have shown slightly enhanced accuracy when people judged emotions from their own culture (Elfenbein & Ambady, 2002; Laukka et al., 2016). Still, the telltale signs of emotion generally cross cultures. The world over, children cry when distressed, shake their heads when defiant, and smile when they are happy. So, too, with blind children who have never seen a face (Eibl-Eibesfeldt, 1971). People blind from birth spontaneously exhibit the common facial expressions associated with such emotions as joy, sadness, fear, and anger (Galati et al., 1997).

Do these shared emotional categories reflect shared *cultural* experiences, such as movies and TV broadcasts seen around the world? Apparently not. Paul Ekman and Wallace Friesen (1971) asked isolated people in New Guinea to respond to such statements as, “Pretend your child has died.” When North American college and university students viewed the recorded responses, they easily read the New Guineans’ facial reactions.

> “*For news of the heart, ask the face.*”
>
> *Guinean proverb*

So we can say that facial muscles speak a universal language. This discovery would not have surprised Charles Darwin (1809–1882), who argued that in prehistoric times, before our ancestors communicated in words, they communicated threats, greetings, and submission with facial expressions. Their shared expressions helped them survive (Hess &

Thibault, 2009). In confrontations, for example, a human sneer retains elements of an animal baring its teeth in a snarl. Emotional expressions may enhance our survival in other ways, too. Surprise raises the eyebrows and widens the eyes, enabling us to take in more information. Disgust wrinkles the nose, closing it from foul odors.

Smiles are social as well as emotional events. Euphoric Olympic gold-medal winners typically don't smile when they are awaiting their award ceremony. But they wear broad grins when interacting with officials and when facing the crowd and cameras (Fernández-Dols & Ruiz-Belda, 1995). Thus, a glimpse at competitors' spontaneous expressions following Olympic and national judo competitions gives a very good clue to who won, no matter their country (Crivelli et al., 2015; Matsumoto & Willingham, 2006, 2009). Even natively blind athletes, who have never observed smiles, display social smiles in such situations (Matsumoto et al., 2009).

Scott Olson/Getty Images

Universal emotions No matter where on Earth you live, you have no trouble recognizing the joy experienced by Chicago Cubs fans over their 2016 World Series victory following a 108-year wait.

Although we share a universal facial language for some emotions, it has been adaptive for us to interpret faces in particular contexts (**Figure 42.6**). People judge an angry face set in a frightening situation as afraid. They judge a fearful face set in a painful situation as pained (Carroll & Russell, 1996). Movie directors harness this phenomenon by creating scenes and soundtracks that amplify our perceptions of particular emotions.

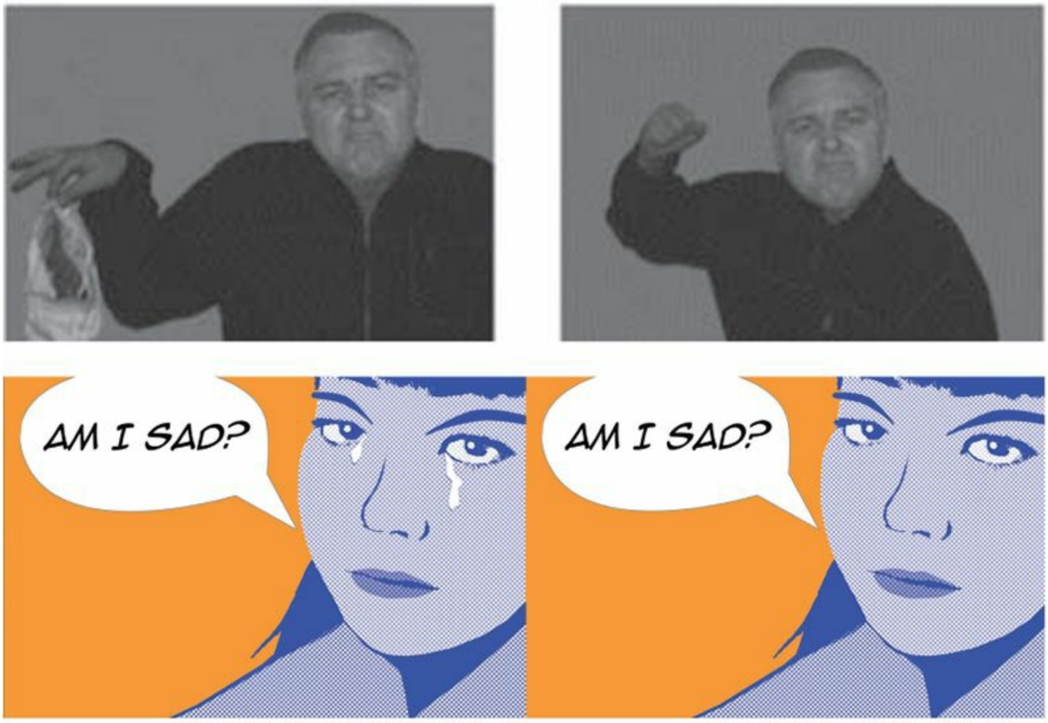

AM I SAD?
AM I SAD?

Figure 42.6
Top: Paul Ekman, Ph.D./Paul Ekman Group, LLC; Bottom: R. R. Provine. Emotional tears and NGF: A biographical appreciation and research beginning. *Archives Italiennes de Biologie, 149*, 271–276.

Figure 42.6 We read faces in context

Whether we perceive the man in the top row as disgusted or angry depends on which body his face appears on (Aviezer et al., 2008). In the second row, tears on a woman’s face make her expression seem sadder (Provine et al., 2009).

FYI

While weightless, astronauts’ internal bodily fluids move toward their upper body and their faces become puffy. This makes nonverbal communication more difficult, especially among multinational crews (Gelman, 1989).

Cultures may share a facial language, but they differ in how *much* emotion they express. Those that encourage individuality, as in Western Europe, Australia, New Zealand, and North America, display visible emotions (van Hemert et al., 2007). Those that encourage people to adjust to others, as in Japan and China, often have less visible emotional displays (Matsumoto et al., 2009; Tsai et al., 2007). In Japan, people infer emotion more from the surrounding context. Moreover, the mouth, often so expressive in North Americans, conveys less emotion than do the telltale eyes (Masuda et al., 2008; Yuki et al., 2007). Compared with their counterparts in China, where calmness is emphasized, European-American leaders follow different *display rules*—they express excited smiles six times more frequently in their official photos (**Figure 42.7**) (Tsai et al., 2006, 2016). If we're happy and we know it, our culture will teach us how to show it.

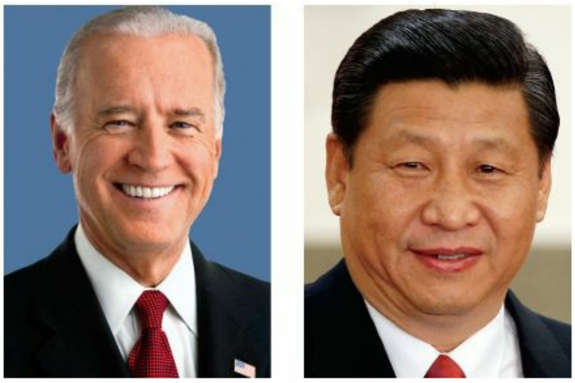


Figure 42.7

Left: Peter Probst/Alamy AP; Right: AP Photo

Figure 42.7 Culture and smiling

Former U.S. Vice President Joe Biden's broad smile and Chinese President Xi Jinping's more reserved one illustrate a cultural difference in facial expressiveness.

Cultural differences also exist *within* nations. The Irish and their Irish-American descendants have tended to be more expressive than the Scandinavians and their Scandinavian-American descendants (Tsai & Chentsova-Dutton, 2003). And that reminds us of a familiar lesson: Like most psychological events, emotion is best understood not only as a biological and cognitive phenomenon, but also as a social-cultural phenomenon.

The Effects of Facial Expressions

42-4 How do our facial expressions influence our feelings?

As William James (1890) struggled with feelings of depression and grief, he came to believe that we can control emotions by going “through the outward movements” of any emotion we want to experience. “To feel cheerful,” he advised, “sit up cheerfully, look around cheerfully, and act as if cheerfulness were already there.”

Studies of emotional effects of facial expressions support what James predicted. Expressions not only communicate emotion, they also amplify and regulate it. In *The Expression of the Emotions in Man and Animals,* Charles Darwin (1872) contended that “the free expression by outward signs of an emotion intensifies it. . . . He who gives way to violent gestures will increase his rage.”

> “*Whenever I feel afraid*
> *I hold my head erect*
>
> *And whistle a happy tune.*”
>
> *Richard Rodgers and Oscar Hammerstein, The King and I, 1958*

Was Darwin right? You can test his hypothesis: Fake a big grin. Now scowl. Can you feel the “smile therapy” difference? Participants in dozens of experiments have felt a difference. Researchers subtly induced students to make a frowning expression by asking them to “contract these muscles” and “pull your brows together” (supposedly to help the researchers attach facial electrodes) (Laird, 1974, 1984; Laird & Lacasse, 2014). The results? The students reported feeling a little angry, as do people who are naturally frowning (by squinting) when facing the Sun (Marzoli et al., 2013). So, too, for other basic emotions. For example, people reported feeling more fear than anger, disgust, or sadness when made to construct a fearful expression: “Raise your eyebrows. And open your eyes wide. Move your whole head back, so that your chin is tucked in a little bit, and let your mouth relax and hang open a little” (Duclos et al., 1989).

This **facial feedback effect** has been found many times, in many places, for many basic emotions (**Figure 42.8**). Just activating one of the smiling muscles by holding a pen in the teeth (rather than gently between the lips, which produces a neutral expression) makes stressful situations less upsetting (Kraft & Pressman, 2012). A hearty smile—made not just with the mouth but with raised cheeks that crinkle the eyes—enhances positive feelings even more when you are reacting to something pleasant or funny (Soussignan, 2001). When happy we smile, and when smiling we become happier. When smiling, you will even more quickly understand sentences that describe pleasant events (Havas et al., 2007). Although some researchers question the reliability of the facial feedback effect (Wagenmakers et al., 2016), many others have replicated it (Strack, 2016).

facial feedback effect

the tendency of facial muscle states to trigger corresponding feelings such as fear, anger, or happiness.

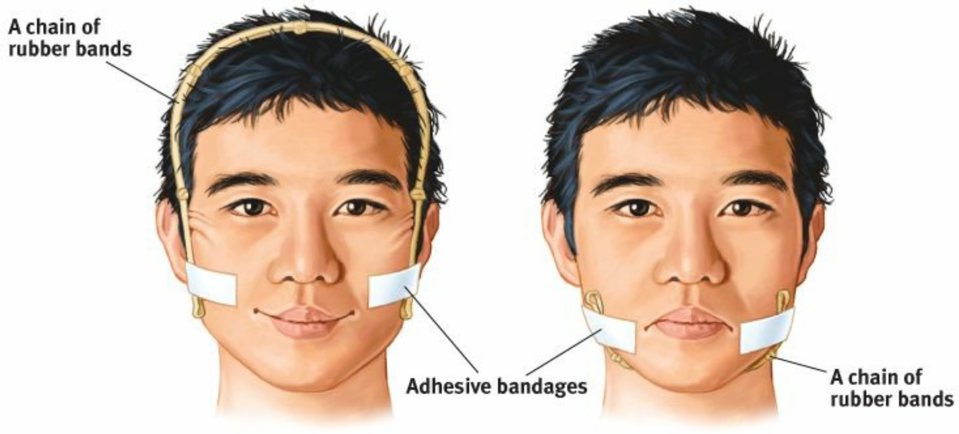

A chain of rubber bands
Adhesive bandages
A chain of rubber bands

Figure 42.8
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 42.8 How to make people smile without telling them to smile

Do as Kazuo Mori and Hideko Mori (2009) did with students in Japan: Attach rubber bands to the sides of the face with adhesive bandages, and then run them either over the head or under the chin.

(1) Based on the *facial feedback effect*, how might students report feeling when the rubber bands raise their cheeks as though in a smile? (2) How might students report feeling when the rubber bands pull their cheeks downward?[2]

So, your face is more than a billboard that displays your feelings; it also feeds your feelings. Scowl and the whole world scowls back. No wonder some depressed patients reportedly felt better after Botox injections paralyzed their frowning muscles (Parsaik et al., 2016). Botox paralysis of the frowning muscles slows people's reading of sadness- or anger-related sentences, and it slows activity in emotion-related brain circuits (Havas et al., 2010; Hennenlotter et al., 2008).

Other researchers have observed a similar **behavior feedback effect** (Carney et al., 2015; Flack, 2006). You can duplicate the participants' experience: Walk for a few minutes with short, shuffling steps, keeping your eyes downcast. Now walk around taking long strides, with your arms swinging and your eyes looking straight ahead. Can you feel your mood shift? Going through the motions awakens the emotions.

behavior feedback effect

the tendency of behavior to influence our own and others' thoughts, feelings, and actions.

You can use your understanding of feedback effects to become more empathic: Let your own face mimic another person's expression. Acting as another acts helps us feel what another feels (Vaughn & Lanzetta, 1981). Losing this ability to mimic others can leave us struggling to make emotional connections, as one social worker with Moebius syndrome, a rare facial paralysis disorder, discovered while working with Hurricane Katrina refugees: When people made a sad expression, "I wasn't able to return it. I tried to do so with words and tone of voice, but it was no use. Stripped of the facial expression, the emotion just dies there, unshared"

(Carey, 2010).

Our natural mimicry of others’ emotions helps explain why emotions are contagious (Dimberg et al., 2000; Neumann & Strack, 2000; Peters & Kashima, 2015). Positive, upbeat Facebook posts create a ripple effect, leading Facebook friends to also express more positive emotions (Kramer, 2012).

* * *

Having considered our emotions, we now ask how our emotions—and our personality, attitudes, and behaviors—influence our risk of disease. What can we do to prevent illness and promote health? Let’s consider some of psychology’s findings on stress and ways of coping with it.

✓ Check Your Understanding

Ask Yourself

- Can you think of one situation in which you would like to change the way you feel, and create a simple plan for doing so? For instance, if you would like to feel more cheerful on your way to class tomorrow morning, rather than dragging yourself there, you might try walking briskly—with head held high and a pleasant expression on your face.

Test Yourself

- _______________ (Women/Men) report experiencing emotions more deeply, and they tend to be more adept at reading nonverbal behavior.
- Are people more likely to differ culturally in their interpretations of facial expressions, or of gestures?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 42 REVIEW

42-1 How do we communicate nonverbally?

- Much of our communication is through body movements, facial expressions, and voice tones. Even seconds-long filmed slices of behavior can reveal feelings.

42-2 How do the genders differ in their ability to communicate nonverbally?

- Women tend to read emotional cues more easily and to express more empathy.

42-3 How are gestures and facial expressions understood within and across cultures?

- The meaning of gestures varies with culture, but facial expressions, such as those of happiness and fear, are common the world over.
- Cultures also differ in the amount of emotion they express.

42-4 How do our facial expressions influence our feelings?

- Research on the *facial feedback effect* shows that our facial expressions can trigger emotional feelings and signal our body to respond accordingly. We also mimic others' expressions, which helps us empathize.
- A similar *behavior feedback effect* is the tendency of behavior to influence our own and others' thoughts, feelings, and actions.

Multiple-Choice Questions

1. Researchers have discovered that people most readily identify which emotion, when given images of faces with a variety of facial expressions?

a. Happiness
b. Anger
c. Sadness
d. Surprise
e. Disgust

2. Which of the following provides the largest nonverbal cue to the emotional state of another person?

a. Bouncing leg
b. Eyebrows
c. Mouth and eyes
d. Hair standing up
e. Respiration rate

3. When asked to picture an angry person, researchers found that

a. men tend to picture a man and women picture a woman.
b. women tend to picture a man and men picture a woman.
c. women and men both picture a woman.
d. women and men both picture a man.
e. the responses of men and women were too varied to provide any substantial data.

Practice FRQs

1. Audrey is participating in a study on emotions. Explain how each of the following could be part of the study:

- Facial feedback effect
- Behavior feedback effect
- Ekman’s research on emotional expression

Answer

1 point: Thanks to the facial feedback effect, we know that even faking an expression affects how we feel. So, for example, faking a smile tends to make us feel happier. Audrey may describe herself as happier if asked to make a happy face. Page 447

1 point: The behavior feedback effect explains our tendency to respond emotionally to the way we’re acting. So, if Audrey is asked to slouch in her chair for a while, she may report feeling less energetic and cheerful. Page 448

1 point: Ekman discovered that the facial expressions of emotions are the same around the world. Audrey would probably not have any problem identifying each emotion being expressed in a global collection of faces. Page 445

2. Olivia and David have been married for several years. Olivia criticizes her husband for not being as empathic as she is. Explain four research findings that support her assertion.

(4 points)

Module **43 Stress and Illness**

LEARNING TARGETS

- 43-1 Discuss how our appraisal of an event affects our stress reaction, and describe the three main types of stressors.
- 43-2 Discuss how we respond and adapt to stress.
- 43-3 Discuss how stress makes us more vulnerable to disease.
- 43-4 Explain why some of us are more prone than others to coronary heart disease.
- 43-5 Discuss whether stress *causes* illness.

Stress often strikes without warning. Imagine being 21-year-old Ben Carpenter, who experienced the world’s wildest and fastest wheelchair ride. As he crossed a street, the light changed and a semitruck started moving into the intersection. When they bumped, Ben’s wheelchair handles got stuck in the truck’s grille. The driver, who hadn’t seen Ben and couldn’t hear his cries for help, took off down the highway, pushing the wheelchair at 50 miles per hour until reaching his destination two miles away. “It was very scary,” said Ben.

Michigan State Police

Extreme stress From the audio recording of a 911 caller reporting Ben Carpenter's distress: "You are not going to believe this. There is a semitruck pushing a guy in a wheelchair on Red Arrow highway!"

How often do you experience stress in your daily life? For many students, the high school years, with their new relationships and more demanding challenges, prove stressful. Deadlines loom at the end of each term. The time demands of volunteering, sports, music and theater, work, college prep courses, and college applications combine with occasional family tensions and success pressures. Sometimes it's enough to give you a headache or disrupt sleep.

Do you feel differently about stressful situations that seem imposed on you (assignments, deadlines, tragic events) than about the stress you impose on yourself (adventures, challenges, happy changes)? As we will see, our interpretation of events affects our experience of those events and whether we even consider them stressful. In this section, we take a closer look at stress—what it is and how it affects our health and well-being. Let's begin with some basic terms.

Stress: Some Basic Concepts

43-1 How does our appraisal of an event affect our stress reaction, and what are the three main types of stressors?

Stress is the process of appraising and responding to a threatening or challenging event (**Figure 43.1**). But *stress* is a slippery concept. We sometimes use the word informally to describe threats or challenges (“Ben was under a lot of stress”), and at other times our responses (“Ben experienced acute stress”). To a psychologist, the terrifying truck ride was a *stressor*. Ben’s physical and emotional responses were a *stress reaction*. And the process by which he related to the threat was *stress*. Stress arises less from events themselves than from how we appraise them (Lazarus, 1998). One person, alone in a house, ignores its creaking sounds and experiences no stress; someone else suspects an intruder and becomes alarmed. One person regards a new job as a welcome challenge; someone else appraises it as risking failure.

stress

the process by which we perceive and respond to certain events, called *stressors*, that we appraise as threatening or challenging.

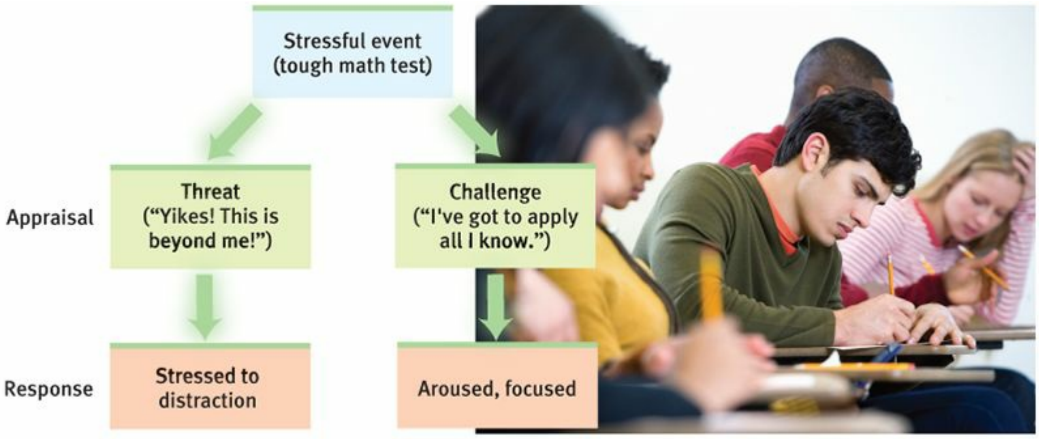

Stressful event
(tough math test)
Appraisal
Threat
(“Yikes! This is beyond me!”)
Challenge
(“I’ve got to apply all I know.”)
Response
Stressed to distraction
Aroused, focused

Figure 43.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Photo: Fuse/Getty Images

Figure 43.1 Stress appraisal

The events of our lives flow through a psychological filter. How we appraise an event influences how much stress we experience and how effectively we respond.

When short-lived, or when perceived as challenges, stressors can have positive effects. A momentary stress can mobilize the immune system for fending off infections and healing wounds (Segerstrom, 2007). Stress also arouses and motivates us to conquer problems. In a Gallup world poll, those who were stressed but not depressed reported being energized and satisfied with their lives. This is the opposite of the lethargy reported by those who were depressed but not stressed (Ng et al., 2009). Championship athletes, successful entertainers, motivated students, and great teachers and leaders all thrive and excel when aroused by a challenge (Blascovich & Mendes, 2010; Wang et al., 2015a). In games and athletic contests, the stress of not knowing who will win makes the competition enjoyable (Abuhamdeh et al., 2015). Having conquered cancer or rebounded from a lost job, some people emerge with stronger self-esteem and a deepened spirituality and sense of purpose. Indeed, experiencing some stress early in life builds resilience (Seery, 2011). Adversity can produce growth.

But extreme or prolonged stress can harm us. Stress can trigger risky decisions and unhealthy behaviors (Cohen et al., 2016; Starcke & Brand, 2016). When facing stress, people may smoke or drink. And stress can affect health directly. Pregnant women with overactive stress systems tend to have shorter pregnancies, which pose health risks for their infants (Guardino et al., 2016).

So there is an interplay between our head and our health. That isn’t surprising. *Behavioral medicine* research provides a reminder of one of contemporary psychology’s overriding themes: *Mind and body interact; everything psychological is simultaneously physiological.* Before exploring that interplay, let’s look more closely at stressors and stress reactions.

Stressors—Things That Push Our Buttons

Stressors fall into three main types: catastrophes, significant life changes, and daily hassles (including social stress). All can be toxic.

Catastrophes

Catastrophes are unpredictable large-scale events: earthquakes, floods, wildfires, storms. After such events, damage to emotional and physical health can be significant. In the four months after Hurricane Katrina, New Orleans' suicide rate reportedly tripled (Saulny, 2006). And in surveys taken in the three weeks after the 9/11 terrorist attacks, 58 percent of Americans said they were experiencing greater-than-average arousal and anxiety (Silver et al., 2002). In the New York City area, people were especially likely to report such symptoms, and sleeping pill prescriptions rose by a reported 28 percent (HMHL, 2002; NSF, 2001). Extensively watching 9/11 television footage predicted worse health outcomes two to three years later (Silver et al., 2013). A similar uptick in health issues, from heart problems to suicides, immediately followed the 2011 terrorist attacks in Norway (Strand et al., 2016).

© Julien Tack

Seismic stress Unpredictable large-scale events, such as the catastrophic earthquake that devastated Haiti in 2010 (aftermath shown here), trigger significant levels of stress-related ills. When an earthquake struck Los Angeles in 1994, sudden-death heart attacks increased fivefold. Most occurred in the first two hours after the quake and near its center and were unrelated to physical exertion (Muller & Verrier, 1996).

For those who respond to catastrophes by relocating to another country, the stress may be twofold. The trauma of uprooting and family separation may combine with the challenges of adjusting to a new culture's language, ethnicity, climate, and social norms (Pipher, 2002; Williams & Berry, 1991). In the first half-year, before their morale begins to rebound, newcomers often experience culture shock and deteriorating well-being (Markovizky & Samid, 2008). This *acculturative stress* declines over time, especially when people engage in meaningful activities and connect socially (Kim et al., 2012). In years to come, such relocations may become increasingly common due to climate change.

Significant Life Changes

Life transitions—having a loved one die, a friend move away, a favorite aunt and uncle getting a divorce—are often keenly felt. Even happy events, such as graduating from high school or leaving home for college, can be stressful life transitions. Many significant life changes happen during young adulthood (**Figure 43.2**). One survey asked 15,000 Canadian adults whether they were "trying to take on too many things at once." It found the highest stress levels among young adults (Statistics Canada, 1999). This greater stress of young adulthood also appeared when 650,000 Americans were asked if they had experienced a lot of stress "yesterday" (Newport & Pelham, 2009).

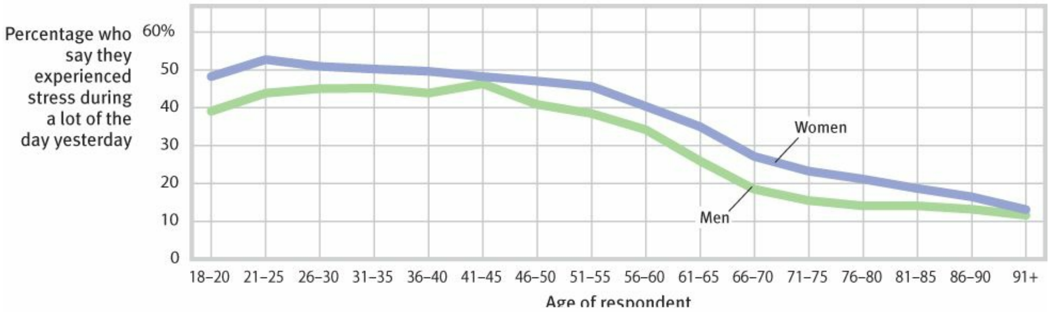


Figure 43.2
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Figure 43.2 Age and stress

A Gallup-Healthways survey of more than 650,000 Americans during 2008 and 2009 found daily stress highest among younger adults (Newport & Pelham, 2009).

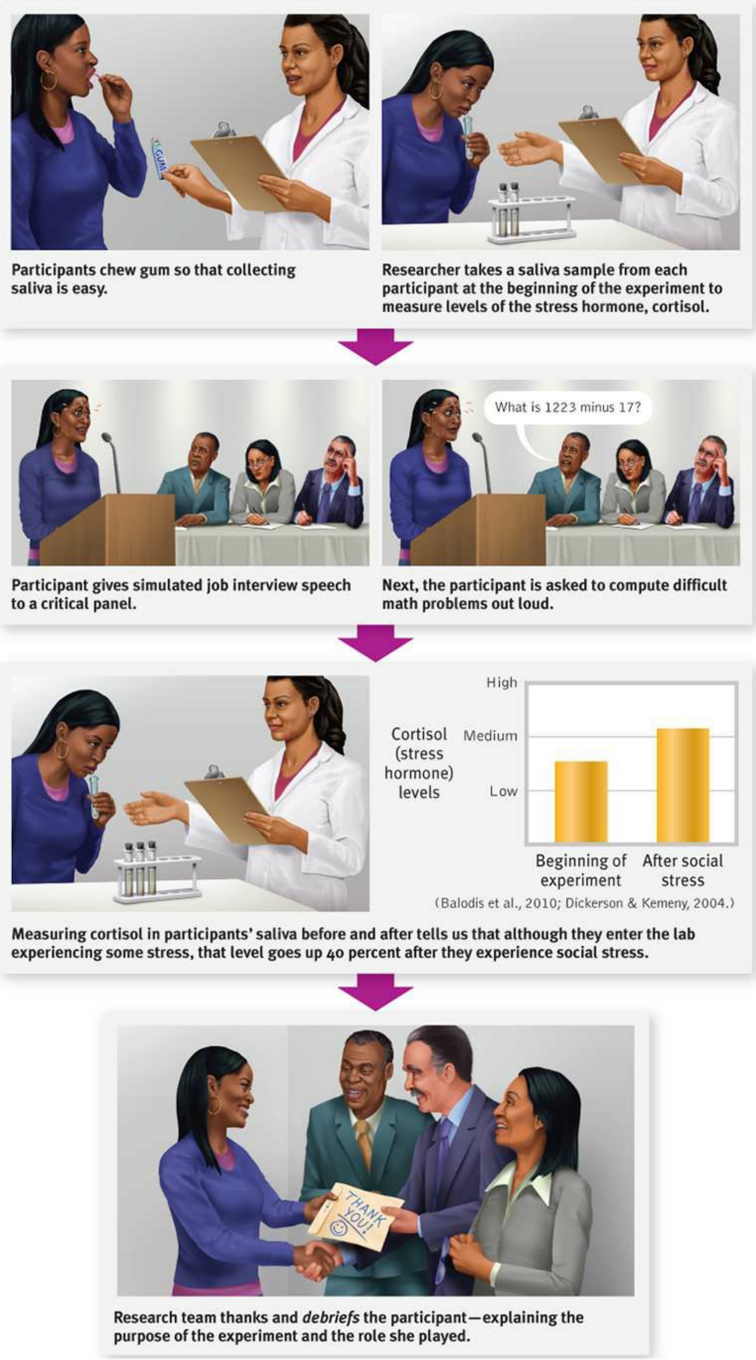
Rob Byron/Shutterstock

Don’t stop believing you can beat stress Singing in public can cause stress. In one experiment, participants publicly sang the Journey song “Don’t Stop Believin’” (Brooks, 2014). Most people experienced stress, but those who told themselves, “I am excited” felt less stress and earned more performance bonus money. It paid to convert anxiety to excitement.

Some psychologists study the health effects of life changes by following people over time. Others compare the life challenges experienced by those who have (or have not) suffered a health problem, such as a heart attack. In such studies, those recently widowed, fired, or divorced have been more vulnerable to disease (Dohrenwend et al., 1982; Sbarra et al., 2015; Strully, 2009). One Finnish study of 96,000 widowed people found that the survivor’s risk of death doubled in the week following a partner’s death (Kaprio et al., 1987). A cluster of crises—losing a job, home, and partner—puts one even more at risk.

Daily Hassles and Social Stress

Events don’t have to remake our lives to cause stress. Stress also comes from *daily hassles*—dead cell phones, aggravating siblings, and too many things to do (Lazarus, 1990; Pascoe & Richman, 2009; Ruffin, 1993). We might have to give a public speech or do difficult math problems (Balodis et al., 2010; Dickerson & Kemeny, 2004) (**Figure 43.3**). Some people shrug off such hassles; others cannot. This is especially the case for adults who wake up each day facing housing problems, unreliable child care, budgets that won’t stretch to the next payday, and poor health. Such stressors add up and take a toll on health and well-being (DeLongis et al., 1982, 1988; Piazza et al., 2013; Sin et al., 2015).


GUM
What is 1223 minus 17?
Cortisol (stress hormone) levels
High
Medium
Low
Beginning of experiment
After social stress
THANK YOU!

Participants chew gum so that collecting saliva is easy.

Researcher takes a saliva sample from each participant at the beginning of the experiment to measure levels of the stress hormone, cortisol.

Participant gives simulated job interview speech to a critical panel.

Next, the participant is asked to compute difficult math problems out loud.

(Balodis et al., 2010; Dickerson & Kemeny, 2004.)

Measuring cortisol in participants' saliva before and after tells us that although they enter the lab experiencing some stress, that level goes up 40 percent after they experience social stress.

Research team thanks and *debriefs* the participant—explaining the purpose of the experiment and the role she played.

Figure 43.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 43.3 Studying stress

Most people experience stress when giving a public speech. To study stress, researchers re-create this type of situation. At the end, they *debrief* and reassure each participant.

Daily pressures may be compounded by prejudice against our gender identity, sexual orientation, or ethnicity, which—like other stressors—can have both psychological and physical consequences (Lick et al., 2013; Pascoe & Richman, 2009; Schetter et al., 2013). Thinking that some of the people you encounter each day will dislike, distrust, or doubt you makes daily life stressful. When prolonged, such stress takes a toll on our health. For many African-Americans, for example, stress can lead to unhealthy blood pressure levels and sleep deprivation, which can reduce academic achievement (Levy, D. J., et al., 2016).

The Stress Response System

43-2 How do we respond and adapt to stress?

Medical interest in stress dates back to Hippocrates (460–377 B.C.E.). In the 1920s, Walter Cannon (1929) confirmed that the stress response is part of a unified mind-body system. He observed that extreme cold, lack of oxygen, and emotion-arousing events all trigger an outpouring of the adrenal stress hormones epinephrine (adrenaline) and norepinephrine (noradrenaline). When alerted by any of a number of brain pathways, the sympathetic nervous system arouses us, preparing the body for the wonderfully adaptive response that Cannon called *fight or flight.* It increases heart rate and respiration, diverts blood from digestion to the skeletal muscles, dulls feelings of pain, and releases sugar and fat from the body's stores. By fighting or fleeing, we increase our chances of survival.

Since Cannon's time, physiologists have identified an additional stress response system. On orders from the cerebral cortex (via the hypothalamus and pituitary gland), the outer part of the adrenal glands secretes *glucocorticoid* stress hormones such as *cortisol.* The two systems work at different speeds, explained biologist Robert Sapolsky (2003): "In a fight-or-flight scenario, epinephrine is the one handing out guns; glucocorticoids are the ones drawing up blueprints for new aircraft carriers needed for the war effort." The epinephrine guns were firing at high speed during an experiment inadvertently conducted on a British Airways San Francisco to

London flight. Three hours after takeoff, a mistakenly played message told passengers the plane was about to crash into the sea. Although the flight crew immediately recognized the error and tried to calm the terrified passengers, several required medical assistance (Associated Press, 1999).

Canadian scientist Hans Selye's (1936, 1976) 40 years of research on stress extended Cannon's findings. His studies of animals' reactions to various stressors, such as electric shock and surgery, helped make stress a major concept in both psychology and medicine. Selye proposed that the body's adaptive response to stress is so general that, like a single burglar alarm, it sounds, no matter what intrudes. He named this response the **general adaptation syndrome (GAS)**, and he saw it as a three-phase process (**Figure 43.4**). Let's say you suffer a physical or an emotional trauma:

- In *Phase 1,* you have an *alarm reaction,* as your sympathetic nervous system is suddenly activated. Your heart rate zooms. Blood is diverted to your skeletal muscles. You feel the faintness of shock. With your resources mobilized, you are now ready to fight back.
- During *Phase 2, resistance,* your temperature, blood pressure, and respiration remain high. Your adrenal glands pump hormones into your bloodstream. You are fully engaged, summoning all your resources to meet the challenge. As time passes, with no relief from stress, your body's reserves begin to dwindle.
- You have reached *Phase 3, exhaustion.* With exhaustion, you become more vulnerable to illness or even, in extreme cases, collapse and death.

general adaptation syndrome (GAS)

Selye's concept of the body's adaptive response to stress in three phases—alarm, resistance, exhaustion.

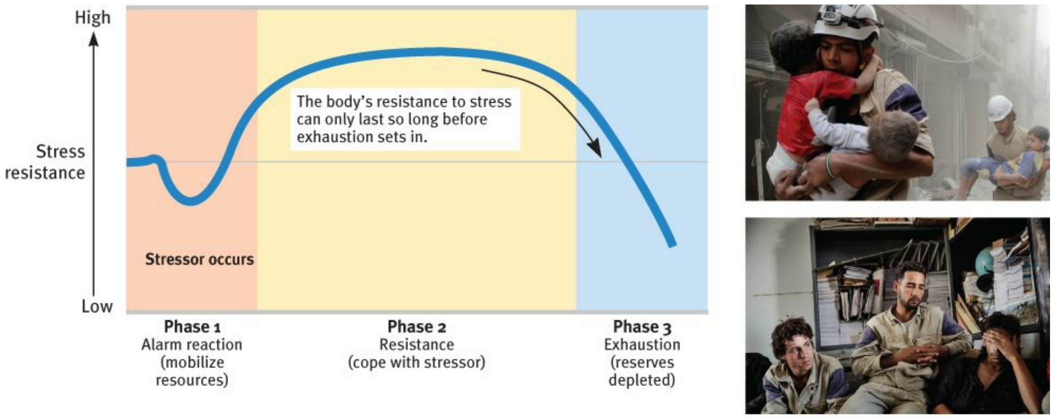


Figure 43.4
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Right top: Sultan Kitaz/Reuters/REUTERS/Newscom; Right bottom: Sebastiano Tomada/Getty Images Reportage

Figure 43.4 Selye's general adaptation syndrome

Due to the ongoing conflict, Syria's White Helmets (volunteer rescuers) have been perpetually in "alarm reaction" mode, rushing to pull victims from the rubble after each fresh attack. As their resistance depletes, they risk exhaustion

Flip It Video: General Adaptation Syndrome

AP® EXAM TIP

Be able to differentiate Walter Cannon's fight-or-flight theory and Hans Selye's general adaptation syndrome. These have been on the AP® exam in the past.

Selye's basic point: Although the human body copes well with temporary stress, prolonged stress can damage it. Severe childhood stress gets under the skin, leading to greater adult stress responses and disease risk (Fagundes & Way, 2014; Hanson et al., 2015; McCrory et al., 2015). In one two-decade-long study, severely stressed Welsh children were three times more likely as adults to develop heart disease (Ashton et al., 2016). The brain's production of new neurons also slows and some neural circuits degenerate (Dias-Ferreira et al., 2009; Mirescu & Gould, 2006). Former prisoners of war, who experienced constant stress and suffering, have died sooner than their fellow soldiers not taken captive (Solomon et al., 2014).

> “*We sleep afraid, we wake up afraid, and leave our homes afraid.*”
>
> *15-year-old girl’s Facebook post, describing her family’s daily life in war-torn Yemen (al-Asaadi, 2016).*

One study found shortened *telomeres* (DNA pieces at the ends of chromosomes) in those who suffered severe childhood stressors (Puterman et al., 2016). Telomere shortening is a normal part of the aging process; when telomeres get too short, the cell can no longer divide and it ultimately dies. In a study of women who suffered enduring stress as caregivers for children with serious disorders, those who were most stressed had cells that looked a decade older than their chronological age (Epel et al., 2004). Severe stress seems to prematurely age people.

Matthew Diffee The New Yorker Collection
/The Cartoon Bank

“You may be suffering from what’s known as full-nest syndrome.”

We respond to stress in other ways, too. One response is common after a loved one’s death: Withdraw. Pull back. Conserve energy. Faced with an extreme disaster, such as a ship sinking, some people become paralyzed by fear. Another, found often among women, is to give and receive support—what’s called the **tend-and-befriend response** (Lim & DeSteno, 2016; Taylor, 2006; Taylor et al., 2000).

tend-and-befriend response

under stress, people (especially women) often provide support to others (tend) and bond with and seek support from others (befriend).

Facing stress, men more often than women tend to withdraw socially, turn to alcohol, or become emotionally insensitive (Bodenmann et al., 2015). Women more often respond to stress by nurturing and banding together.

✓ Check Your Understanding

Ask Yourself

- How often is your stress response system activated? What are some of the things that have triggered a fight-or-flight response for you?

Test Yourself

- The stress response system: When alerted to a negative, uncontrollable event, our _______________ nervous system arouses us. Heart rate and respiration _______________ (increase/decrease). Blood is diverted from digestion to the skeletal _______________. The body releases sugar and fat. All this prepares the body for the _______________ – _______________ – _______________response.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Stress and Vulnerability to Disease

43-3 How does stress make us more vulnerable to disease?

It often pays to spend our resources in fighting or fleeing an external threat. But we do so at a cost. When stress is momentary, the cost is small. When stress persists, the cost may be greater, in the form of lowered resistance to infections and other threats to mental and physical well-being.

To study how stress—and healthy and unhealthy behaviors—influence health and illness, psychologists and physicians created the interdisciplinary field of *behavioral medicine*, integrating behavioral and medical knowledge. **Health psychology** provides psychology's contribution to behavioral medicine. A branch of health psychology called **psychoneuroimmunology** focuses on mind-body interactions (Kiecolt-Glaser, 2009). This awkward name makes sense when said slowly: Your thoughts and feelings *(psycho)* influence your brain *(neuro),* which influences the endocrine hormones that affect your disease-fighting *immune* system. And this subfield is the study of *(ology)* those interactions.

health psychology

a subfield of psychology that provides psychology's contribution to behavioral medicine.

psychoneuroimmunology

the study of how psychological, neural, and endocrine processes together affect the immune system and resulting health.

If you've ever had a stress headache, or felt your blood pressure rise with anger, you don't need to be convinced that our psychological states have physiological effects. Stress can even leave you less able to fight off disease because your nervous and endocrine systems influence your immune system (Sternberg, 2009). You can think of the immune system as a complex surveillance system. When it functions properly, it keeps you healthy by isolating and destroying bacteria, viruses, and other invaders. Four types of cells are active in these search-and-destroy missions:

- *B lymphocytes,* which release antibodies that fight bacterial infections;
- *T lymphocytes,* which attack cancer cells, viruses, and foreign substances;
- *macrophage cells* ("big eaters"), which identify, pursue, and ingest harmful invaders and worn-out cells; and
- *natural killer cells* (NK cells), which attack diseased cells (such as those infected by viruses or cancer). (**Figure 43.5**).

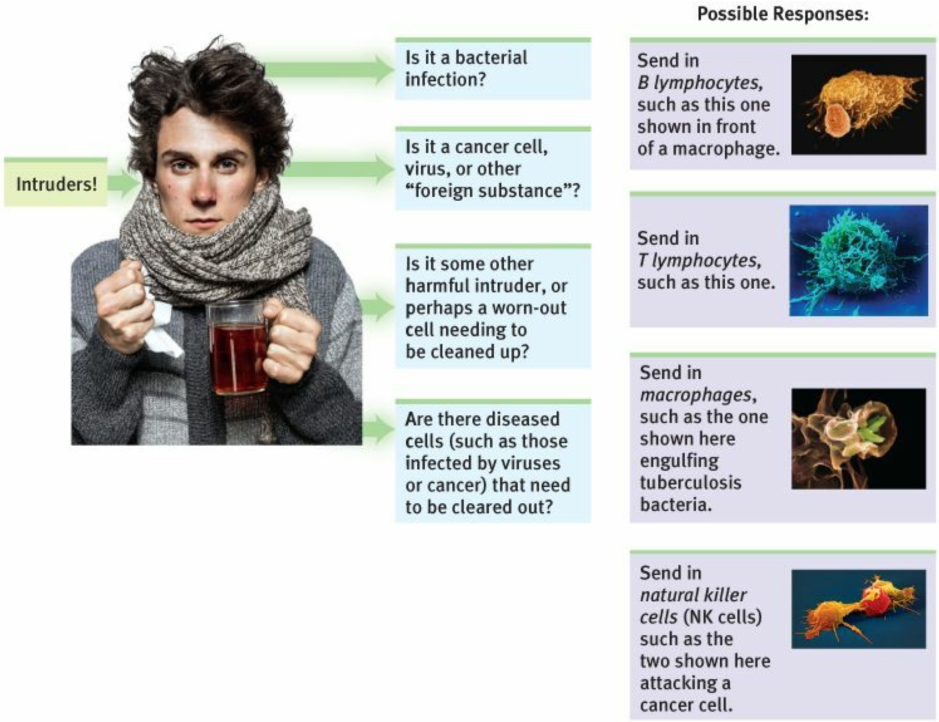

Possible Responses:
Intruders!
Is it a bacterial infection?
Is it a cancer cell, virus, or other "foreign substance"?
Is it some other harmful intruder, or perhaps a worn-out cell needing to be cleaned up?
Are there diseased cells (such as those infected by viruses or cancer) that need to be cleared out?
Send in *B lymphocytes*, such as this one shown in front of a macrophage.
Send in *T lymphocytes*, such as this one.
Send in *macrophages*, such as the one shown here engulfing tuberculosis bacteria.
Send in *natural killer cells* (NK cells) such as the two shown here attacking a cancer cell.

Figure 43.5
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Left: Romariolen/Shutterstock; Right-i: CNRI/Science Source; Right-ii: NIBSC/Science Source; Right-iii: SPL/Science Source; Right-iv: Eye of Science/Science Source

Figure 43.5 **A simplified view of immune responses**

Your age, nutrition, genetics, body temperature, and stress all influence your immune system's activity. When your immune system doesn't function properly, it can err in two directions:

1. Responding too strongly, it may attack the body's own tissues, causing an allergic reaction or a self-attacking disease, such as lupus, multiple sclerosis, or some forms of arthritis. Women, who are immunologically stronger than men, are more susceptible to self-attacking diseases (Nussinovitch & Schoenfeld, 2012; Schwartzman-Morris & Putterman, 2012).
2. Underreacting, the immune system may allow a bacterial infection to flare, a dormant virus to erupt, or cancer cells to multiply. To protect transplanted organs, which the recipient's body treats as foreign invaders, surgeons may deliberately suppress the patient's immune system.

Stress can also trigger immune suppression by reducing the release of disease-fighting lymphocytes. This has been observed when animals were stressed by physical restraints, unavoidable electric shocks, noise, crowding, cold water, social defeat, or separation from their mothers (Maier et al., 1994). One study monitored immune responses in 43 monkeys over six months (Cohen et al., 1992). Half were left in stable groups. The rest were stressed by being housed with new roommates—3 or 4 new monkeys each month. By the end of the experiment, the socially disrupted monkeys had weaker immune systems.

Human immune systems react similarly. Three examples:

- *Surgical wounds heal more slowly in stressed people.* In one experiment, dental students received punch wounds (precise small holes punched in the skin). Compared with wounds placed during summer vacation, those placed three days before a major exam healed 40 percent more slowly (Kiecolt-Glaser et al., 1998). In other studies, marriage conflict has also slowed punch-wound healing (Kiecolt-Glaser et al., 2005).
- *Stressed people are more vulnerable to colds.* Major life stress increases the risk of a respiratory infection (Pedersen et al., 2010). When researchers dropped a cold virus into people’s noses, 47 percent of those living stress-filled lives developed colds (**Figure 43.6**). Among those living relatively free of stress, only 27 percent did. In follow-up research, the happiest and most relaxed people were likewise markedly less vulnerable to an experimentally delivered cold virus (Cohen, S., et al., 2003, 2006; Cohen & Pressman, 2006).
- *Stress can hasten the course of disease.* As its name tells us, *AIDS (acquired immune deficiency syndrome)* is an immune disorder, caused by the *human immunodeficiency virus (HIV).* Stress cannot give people AIDS. But an analysis of 33,252 participants from around the world found that stress and negative emotions sped the transition from HIV infection to AIDS. And stress predicted a faster decline in those with AIDS (Chida & Vedhara, 2009). The greater the stress that HIV-infected people experienced, the faster their disease progressed.

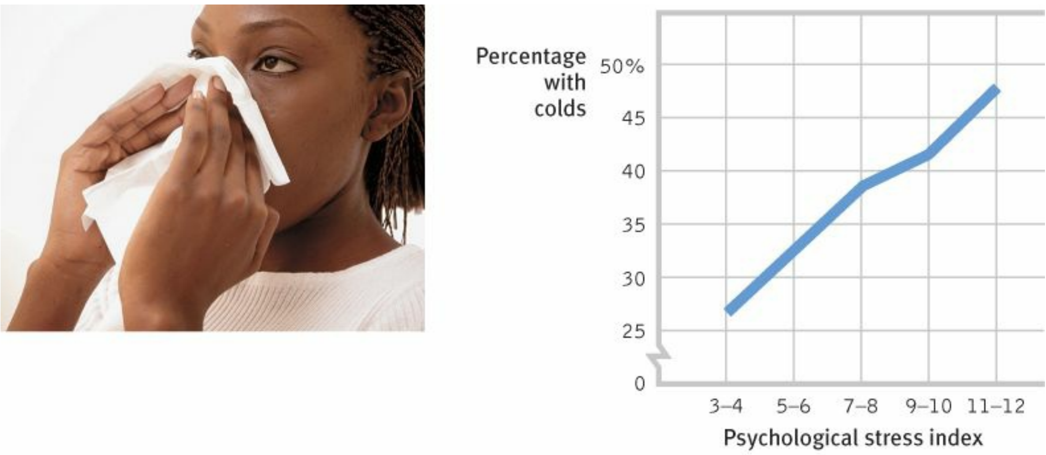


Figure 43.6
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Photo: Laurent/Yakou/Science Source

Figure 43.6 Stress and colds

People with the highest life stress scores were also most vulnerable when exposed to an experimentally delivered cold virus (Cohen et al., 1991).

D. Hurst/Alamy

The stress effect on immunity makes physiological sense. It takes energy to track down invaders, produce swelling, and maintain fevers. Thus, when diseased, your body reduces its muscular energy output by decreasing activity (and increasing sleep). Stress does the opposite. It creates a competing energy need. During an aroused fight-or-flight reaction, your stress responses divert energy from your disease-fighting immune system and send it to your muscles and brain. This renders you more vulnerable to illness. *The point to remember:* Stress does not make us sick, but it does alter our immune functioning, which leaves us less able to resist infection.

✓ Check Your Understanding

Ask Yourself

- How have changes in stress levels—such as increased stress around finals week—affected your health, and the health of other students in your classes?

Test Yourself

- The field of _______________ studies mind-body interactions, including the effects of psychological, neural, and endocrine functioning on the immune system and overall health.
- What general effect does stress have on our health?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Stress and Cancer

Stress does not create cancer cells. But in a healthy, functioning immune system, lymphocytes, macrophages, and NK cells search out and destroy cancer cells and cancer-damaged cells. If stress weakens the immune system, might this weaken a person's ability to fight off cancer? To explore a possible stress-cancer connection, experimenters have implanted tumor cells in rodents or given them *carcinogens* (cancer-producing substances). They then exposed some rodents to uncontrollable stress, such as inescapable shocks, which weakened their immune systems (Sklar & Anisman, 1981). Stressed rodents, compared with their unstressed counterparts, developed cancer more often, experienced tumor growth sooner, and grew larger tumors.

Does this stress-cancer link also hold with humans? The results are generally the same (Lutgendorf & Andersen, 2015). Some studies find that people are at increased risk for cancer within a year after experiencing depression, helplessness, or bereavement (Chida et al., 2008; Steptoe et al., 2010). In one large Swedish study, the risk of colon cancer was 5.5 times greater among people with a history of workplace stress than among those who reported no such problems. This difference was not due to group differences in age, smoking, drinking, or physical characteristics (Courtney et al., 1993). Not all studies, however, have found a link between stress and human cancer (Coyne et al., 2010; Petticrew et al., 1999, 2002). Concentration camp survivors and former prisoners of war, for example, do not have elevated cancer rates.

FYI

When organic causes of illness are unknown, it is tempting to invent psychological explanations. Before the germ that causes tuberculosis was discovered, personality explanations of TB were popular (Sontag, 1978).

One danger in overstating the link between emotions and cancer is that some patients may then blame themselves for their illness: "If only I had been more expressive, relaxed, and hopeful." A corollary danger is a "wellness macho" among the healthy, who take credit for their "healthy character" and lay a guilt trip on the ill: "She has cancer? That's what you get for holding your feelings in and being so nice." Dying thus becomes the ultimate failure.

It's important enough to repeat: *Stress does not create cancer cells.* At worst, it may affect their growth by weakening the body's natural defenses against multiplying malignant cells (Lutgendorf et al., 2008; Nausheen et al., 2010; Sood et al., 2010). Although a relaxed, hopeful state may enhance these defenses, we should be aware of the thin line that divides science from wishful thinking.

> "*I didn't give myself cancer.*"
>
> *Mayor Barbara Boggs Sigmund (1939–1990), Princeton, New Jersey*

Stress and Heart Disease

43-4 Why are some of us more prone than others to coronary heart disease?

Imagine this: You wake up each day, eat your breakfast, and check the news. Among the headlines, you see that four 747 jumbo jets crashed again yesterday, killing another 1642 passengers. You finish your breakfast, grab your bag, and head to class.

Replace airline crashes with **coronary heart disease**, the United States' leading cause of death, and you have re-entered reality. About 610,000 Americans die annually from heart disease (CDC, 2016a). High blood pressure and a family history of the disease increase the risk. So do smoking, obesity, an unhealthy diet, physical inactivity, and a high cholesterol level.

coronary heart disease

the clogging of the vessels that nourish the heart muscle; the leading cause of death in many developed countries.

Stress and personality also play a big role in heart disease. The more psychological trauma people experience, the more their bodies generate *inflammation*, which is associated with heart and other health problems, including depression (Haapakoski et al., 2015; O'Donovan et al., 2012). Plucking a hair and measuring its level of cortisol (a stress hormone) can help indicate whether a child has experienced prolonged stress or predict whether an adult will have a future heart attack (Karlén et al., 2015; Pereg et al., 2011; Vliegenthart et al., 2016).

The Effects of Personality, Pessimism, and Depression

Flip It Video: Type A & Type B

In a classic study, Meyer Friedman, Ray Rosenman, and their colleagues tested the idea that stress increases vulnerability to heart disease by measuring the blood cholesterol level and clotting speed of 40 U.S. male tax accountants at different times of year (Friedman & Ulmer, 1984). From January through March, the test results were completely normal. But as the accountants began scrambling to finish their clients' tax returns before the April 15 filing deadline, their cholesterol and clotting measures rose to dangerous levels. In May and June, with the deadline past, the measures returned to normal. For these men, stress predicted heart attack risk.

So, are some of us at high risk of stress-related coronary heart disease? To answer this question, the researchers launched a longitudinal study of more than 3000 healthy men, aged 35 to 59. The researchers interviewed each man for 15 minutes, noting his work and eating habits, manner of talking, and other behavior patterns. Those who seemed the most reactive, competitive, hard-driving, impatient, time-conscious, super-motivated, verbally aggressive, and easily angered they called **Type A**. The roughly equal number who were more easygoing they called **Type B**.

Type A

Friedman and Rosenman’s term for competitive, hard-driving, impatient, verbally aggressive, and anger-prone people.

Type B

Friedman and Rosenman’s term for easygoing, relaxed people.

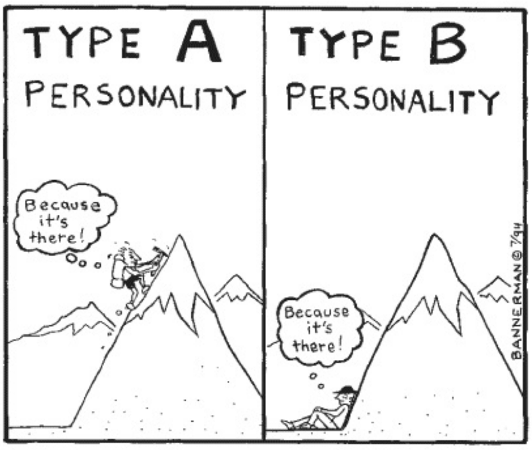
FYI

In both India and America, Type A bus drivers are literally hard-driving: They brake, pass, and honk their horns more often than their more easygoing Type B colleagues (Evans et al., 1987).

Nine years later, 257 men had suffered heart attacks, and 69 percent of them were Type A. Moreover, not one of the “pure” Type Bs—the most mellow and laid-back of their group—had suffered a heart attack.

As often happens in science, this exciting discovery provoked enormous public interest. After that initial honeymoon period, researchers wanted to know more. Was the finding reliable? If so, what was the toxic component of the Type A profile: Time-consciousness? Competitiveness? Anger?

More than 700 studies have explored possible psychological correlates or predictors of cardiovascular health (Chida & Hamer, 2008; Chida & Steptoe, 2009). These reveal that Type A’s toxic core is negative emotions —especially the anger associated with an aggressively reactive temperament. When challenged, our active sympathetic nervous system redistributes bloodflow to our muscles, pulling it away from our internal organs. The liver, which normally removes cholesterol and fat from the blood, can’t do its job. Thus, excess cholesterol and fat may continue to circulate in the blood and later get deposited around the heart. Hostility also correlates with other risk factors, such as smoking, drinking, and obesity (Bunde & Suls, 2006). Our mind and heart interact.



Isabella Bannerman via CartoonStock - www.cartoonstock.com /cartoonview.asp?catref=ibn0107

Hundreds of other studies of young and middle-aged men and women confirm that people who react with anger over little things are the most coronary-prone. In Western cultures, suppressing negative emotions only heightens the risk (Kitayama et al., 2015; Kupper & Denollet, 2007). Rage “seems to lash back and strike us in the heart muscle” (Spielberger & London, 1982).

Sean Locke Photography
/Shutterstock

Pessimism seems to be similarly toxic (Pänkäläinen et al., 2016). One longitudinal study followed 1306 initially healthy men who a decade earlier had scored as optimists, pessimists, or neither (Kubzansky et al., 2001). Even after adjusting for other risk factors such as smoking, pessimists were more than twice as likely as optimists to develop heart disease (**Figure 43.7**). Happy and consistently satisfied people tend to be healthy and to outlive their unhappy peers (Boehm et al., 2015b; Diener & Chan, 2011; Gana et al., 2016). Even a big, happy smile predicts longevity, as researchers discovered when they examined the photos of 150 Major League Baseball players who had appeared in the 1952 *Baseball Register* and had died by 2009 (Abel & Kruger, 2010). On average, the nonsmilers had died at 73, compared with an average 80 years for those with a broad, genuine smile. People with big smiles tend to have extensive social networks, which predict longer life (Hertenstein, 2009). Having a happy spouse also predicts better health. Happy you, healthy me (Chopik & O’Brien, 2017).

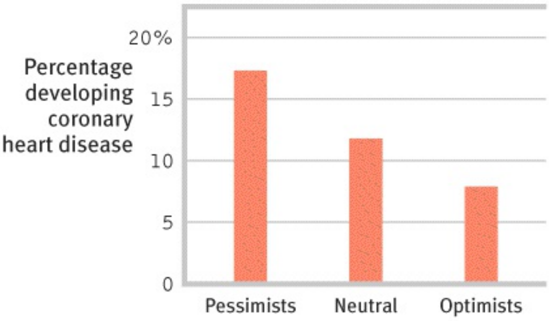


Figure 43.7
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Kubzansky et al., 2001.

Figure 43.7 Pessimism and heart disease

A Harvard School of Public Health team found pessimistic men at doubled risk of developing heart disease over a 10-year period.

Many studies show that depression can likewise be lethal (Wulsin et al., 1999). In one, nearly 4000 English adults (ages 52 to 79) provided mood reports from a single day. Compared with those in a good mood, those in a depressed mood were twice as likely to be dead five years later (Steptoe & Wardle, 2011). In a U.S. survey of 164,102 adults, those who had experienced a heart attack were twice as likely to report also having been depressed at some point in their lives (Witters & Wood, 2015). And in the years following a heart attack, people with high scores for depression were four times more likely than their low-scoring counterparts to develop further heart problems (Frasure-Smith & Lesperance, 2005). Depression is disheartening.

> “*The fire you kindle for your enemy often burns you more than him.*”
>
> *Chinese proverb*

> “*A cheerful heart is a good medicine, but a downcast spirit dries up the bones.*”
>
> *Proverbs 17:22*

Anger Management

Given the connection between chronic hostility, as in the Type A personality, and heart disease, it’s clear we need strategies for anger management. In Western cultures, many believe we can achieve emotional release, or **catharsis**, through aggressive action or fantasy. Expressing anger can indeed be *temporarily* calming if it does not leave us feeling guilty or anxious (Geen & Quanty 1977; Hokanson & Edelman, 1966).

© PhotoSpin, Inc/Alamy

catharsis

in psychology, the idea that "releasing" aggressive energy (through action or fantasy) relieves aggressive urges.

AP® EXAM TIP

It's important to remember the difference between longitudinal and cross-sectional studies.

However, catharsis usually fails to cleanse our rage. More often, expressing anger breeds more anger. For one thing, it may provoke further retaliation, causing a minor conflict to escalate into a major confrontation. For another, expressing anger can magnify anger. As we learned from the *behavior feedback* research in Module 42, *acting* angry can make us *feel* angrier (Flack, 2006; Snodgrass et al., 1986). In one study, people who had been provoked were asked to wallop a punching bag while ruminating about the person who had angered them. Later, when given a chance for revenge, they became even more aggressive (Bushman, 2002).

What are some better ways to manage anger? Experts offer three suggestions:

- **WAIT.** You can reduce the level of physiological arousal of anger by waiting. "It is as true of the body as of arrows," noted Carol Tavris (1982), "what goes up must come down. Any emotional arousal will simmer down if you just wait long enough."
- **FIND A HEALTHY DISTRACTION OR SUPPORT.** Calm yourself by exercising, playing an instrument, or talking it through with a friend. Brain scans show that ruminating inwardly about why you are angry serves only to increase amygdala blood flow (Fabiansson et al., 2012).
- **DISTANCE YOURSELF.** Try to move away from the situation mentally, as if you are watching it unfold from a distance. Self-distancing reduces rumination, anger, and aggression (Kross & Ayduk, 2011; Mischkowski et al., 2012; White et al., 2015).

Stress and Inflammation

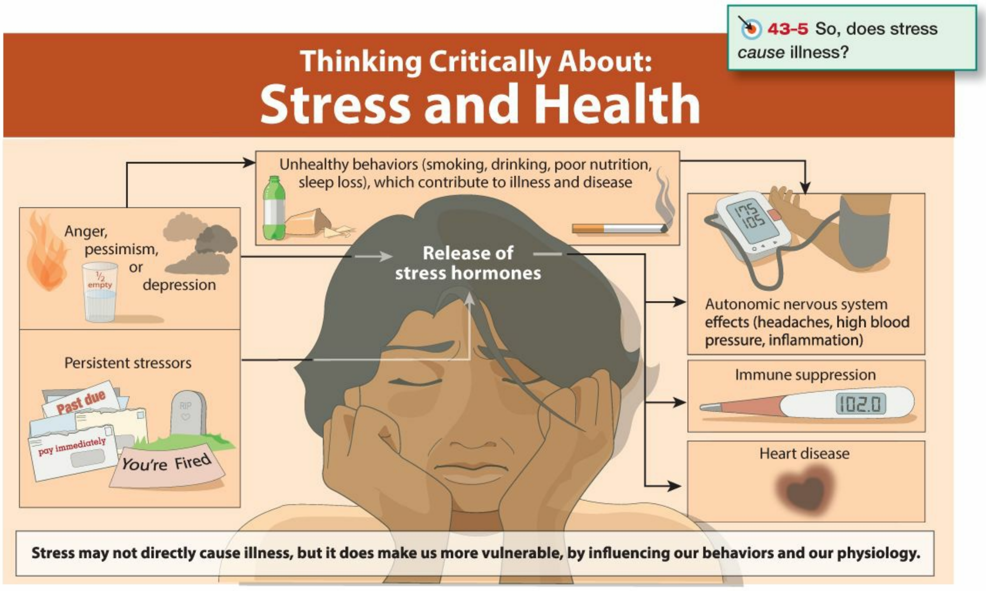
As we have seen, stress also has a disheartening effect: Work stress, involuntary job loss, and trauma-related stress symptoms increase heart disease risk (Allesøe et al., 2010; Gallo et al., 2006; Kubzansky et al., 2009; Slopen et al., 2010). Both heart disease and depression may result when chronic stress triggers blood vessel inflammation (Miller & Blackwell, 2006; Mommersteeg et al., 2016). We know that stress disrupts the body's disease-fighting immune system, enabling the body to focus its energies on fleeing or fighting. People who experience social threats, including children raised in harsh families, are more prone to immune system inflammation responses (Dickerson et al., 2009; Miller & Chen, 2010). So are monkeys that experience the stresses of a low social rank (Snyder-Mackler et al., 2016). Inflammation fights infections. But persistent inflammation can produce problems such as asthma or clogged arteries, and worsen depression.

Jason LaVeris/Getty Images

A broken heart? The day after the death of her beloved daughter, Carrie Fisher, Debbie Reynolds also died. People wondered: Might grief-related depression and stress hormones have contributed to Reynolds’ stroke (Carey, 2016)?

In many ways, stress can affect our health. (See Thinking Critically About: Stress and Health.) The stress-illness connection is a price we pay for the benefits of stress. Stress invigorates our lives by arousing and motivating us. An unstressed life would hardly be challenging or productive.

* * *



43-5 So, does stress *cause* illness?

Thinking Critically About:
Stress and Health
Unhealthy behaviors (smoking, drinking, poor nutrition, sleep loss), which contribute to illness and disease
Anger, pessimism, or depression
½ empty
Release of stress hormones
Persistent stressors
Past due
pay immediately
RIP
You're Fired
175
105
Autonomic nervous system effects (headaches, high blood pressure, inflammation)
Immune suppression
102.0
Heart disease
Stress may not directly cause illness, but it does make us more vulnerable, by influencing our behaviors and our physiology.

Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Research on stress and health reminds us that psychological states are physiological events that influence other parts of our physiological system. Just pausing to *think* about biting into an orange wedge—imagine the sweet, tangy juice from the pulpy fruit flooding across your tongue—can trigger salivation. As an ancient Indian text recognized, “Mental disorders arise from physical causes, and likewise physical disorders arise from mental causes.” There is an interplay between our heads and our health. We are biopsychosocial systems.

Check Your Understanding

Ask Yourself

- Are there changes you could make to avoid the persistent stressors in your life?

Test Yourself

- Which component of the Type A personality has been linked most closely to coronary heart disease?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 43 REVIEW

43-1 How does our appraisal of an event affect our stress reaction, and what are the three main types of stressors?

- *Stress* is the process by which we appraise and respond to stressors—events that challenge or threaten us. If we appraise an event as challenging, we will be aroused and focused in preparation for success. If we appraise an event as a threat, we will experience a stress reaction, and our health may suffer.
- The three main types of stressors are catastrophes, significant life changes, and daily hassles and social stress.

43-2 How do we respond and adapt to stress?

- Walter Cannon viewed the stress response as a “fight-or-flight” system.
- Later researchers identified an additional stress response system in which the adrenal glands secrete glucocorticoid stress hormones, such as cortisol.
- Hans Selye proposed a general three-phase (alarm-resistance-exhaustion) *general adaptation syndrome (GAS).*
- Prolonged stress can damage neurons, hastening cell death.
- Facing stress, women may have a *tend-and-befriend response;* men may withdraw socially, turn to alcohol, or become aggressive.

43-3 How does stress make us more vulnerable to disease?

- *Psychoneuroimmunology* is the study of how psychological, neural, and endocrine processes together affect the immune system and resulting health.
- Stress diverts energy from the immune system, inhibiting the activities of its *B* and *T lymphocytes,* macrophages, and NK cells.

- Stress does not cause diseases such as cancer, but by altering our immune functioning it may make us more vulnerable to diseases and influence their progression.

43-4 Why are some of us more prone than others to coronary heart disease?

- *Coronary heart disease,* the United States’ number one cause of death, has been linked with the competitive, hard-driving, impatient, verbally aggressive, and (especially) anger-prone *Type A* personality.
- Compared with relaxed, easygoing *Type B* personalities, who are less likely to experience heart disease, Type A people secrete more stress hormones.
- *Catharsis* doesn’t work to reduce the anger that can be so harmful to our health, but waiting, distracting, and distancing do.
- Chronic stress also contributes to persistent inflammation, which is associated with heart and other health problems, including depression.

43-5 So, does stress *cause* illness?

- Stress may not directly cause illness, but it does make us more vulnerable, by influencing our behaviors and our physiology.

Multiple-Choice Questions

1. Emily’s family has been traumatized by a recent hurricane in Puerto Rico. Described in terms of the general adaptation syndrome (GAS), which phase would they have experienced first?

a. Resistance
b. Appraisal
c. Exhaustion
d. Alarm
e. Challenge

2. Which term best describes the study of how psychological, neural, and endocrine processes affect our health?

a. Coronary heart disease
b. Psychoneuroimmunology
c. Inflammation
d. Catharsis
e. General adaptation

3. Roberto is an angry person who is prone to outbursts throughout the day. Psychologists would describe him as having a(n) personality.

a. Type A
b. Type B
c. GAS
d. Type T
e. NK cell

4. In order to reduce risk of heart disease, people should attempt to reduce their levels of

a. optimism.
b. apathy.
c. pessimism.
d. competitiveness.
e. empathy.

Practice FRQs

1. Xavier has a huge math test coming up next Tuesday. Explain two ways appraisal can determine how stress will influence his test performance.

Answer

1 point: If Xavier interprets the test as a challenge, he will be aroused and focused in a way that could improve his test performance. ↩ Page 451

1 point: If Xavier interprets the test as a threat, he will be distracted by stress in a way that is likely to harm his test performance. Page 451

2. Jenna’s boyfriend just carried out the most elaborate “promposal” at her school. Use the phases of Hans Selye’s general adaptation syndrome to explain how prom preparations may be stressful for Jenna.

(4 points)

Module **44 Health and Happiness**

LEARNING TARGETS

- **44-1 Discuss the links among basic outlook on life, social support, and stress and health.**
- **44-2 Discuss the effectiveness of aerobic exercise as a way to manage stress and improve well-being.**
- **44-3 Describe how relaxation and meditation might influence stress and health.**
- **44-4 Describe what is meant by the faith factor, and summarize some possible explanations for the link between faith and health.**
- **44-5 Explain the *feel-good, do-good phenomenon,* discuss the focus of positive psychology research, and identify factors that affect our happiness levels.**
- **44-6 Discuss predictors of happiness and how we can be happier.**

Promoting Health

Promoting health begins with implementing strategies that prevent illness and enhance wellness. Traditionally, people have thought about their health only when something goes wrong and they visit a physician. That, say health psychologists, is like ignoring a car's maintenance and going to a mechanic only when the car breaks down. Health maintenance includes alleviating stress, preventing illness, and promoting well-being.

Explanatory Style: Optimism Versus Pessimism

44-1 What are the links among basic outlook on life, social support, and stress and health?

One aspect of our health and our coping is our outlook—what we expect from the world. Pessimists expect things to go badly (Aspinwall & Tedeschi, 2010; Carver et al., 2010; Rasmussen et al., 2009). When bad things happen, pessimists knew it all along. They attribute their poor performance to a basic lack of ability ("I can't do this") or to situations enduringly beyond their control ("There is nothing I can do about it"). Optimists expect to have more control, to cope better with stressful events, and to enjoy better health (Aspinwall & Tedeschi, 2010; Boehm & Kubzansky, 2012; Hernandez et al., 2015). During a semester's last month, students previously identified as optimistic reported less fatigue and fewer coughs, aches, and pains. And during the stressful first few weeks of law school, those who were optimistic ("It's unlikely that I will fail") enjoyed better moods and stronger immune systems (Segerstrom et al., 1998). Optimists also respond to stress with smaller increases in blood pressure, and they recover more quickly from heart bypass surgery.

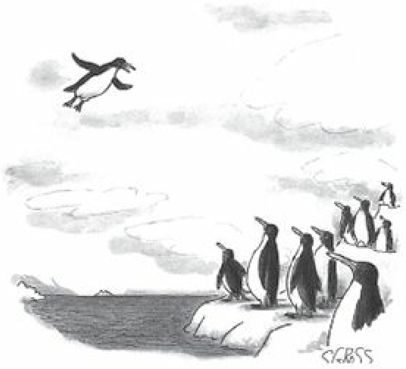
Optimistic students have also tended to get better grades because they often respond to setbacks with the hopeful attitude that effort, good study habits, and self-discipline make a difference (Noel et al., 1987; Peterson & Barrett, 1987). When dating couples wrestle with conflicts, optimists and their partners see each other as engaging constructively, and they then tend to feel more supported and satisfied with the resolution and with their relationship (Srivastava et al., 2006). Optimism relates to well-being and success in many places, including China and Japan (Qin & Piao, 2011). Realistic positive expectations fuel motivation and success (Oettingen & Mayer, 2002).

Consider the consistency and startling magnitude of the optimism and positive emotions factor in several other studies:

- When one research team followed 70,021 nurses over time, they discovered that those scoring in the top quarter on optimism were nearly 30 percent less likely to have died than those scoring in the bottom 25 percent (Kim et al., 2017). Even greater optimism-longevity differences have been found in studies of Finnish men and American Vietnam-era veterans (Everson et al., 1996; Phillips et al., 2009).
- A famous study followed up on 180 Catholic nuns who had written brief autobiographies at about 22 years of age and had thereafter lived similar lifestyles. Those who had expressed happiness, love, and other positive feelings in their autobiographies lived an average 7 years longer than their more dour counterparts (Danner et al., 2001). By age 80, some 54 percent of those expressing few positive emotions had died, as had only 24 percent of the most positive-spirited.

> “ *The optimist proclaims we live in the best of all possible worlds; and the pessimist fears this is true.* ”
>
> *James Branch Cabell,* The Silver Stallion, *1926*

Optimism runs in families, so some people truly are born with a sunny, hopeful outlook. If one identical twin is optimistic, the other often will be as well (Bates, 2015; Mosing et al., 2009). One genetic marker of optimism is a gene that enhances the social-bonding hormone *oxytocin*, which in humans is released, for example, by cuddling, massage, and breast-feeding (Campbell, 2010; Saphire-Bernstein et al., 2011).



Sam Gross The New Yorker Collection/The
Cartoon Bank

"We just haven't been flapping them hard enough."

Positive expectations often motivate eventual success.

The good news is that all of us, even the most pessimistic, can learn to become more optimistic. Compared with a control group of pessimists who simply kept diaries of their daily activities, pessimists in a skill-building group—who learned ways of seeing the bright side of difficult situations and of viewing their goals as achievable—reported lower levels of depression (Sergeant & Mongrain, 2014). Optimism is the light bulb that can brighten anyone's mood.

Social Support

Social support—feeling liked and encouraged by intimate friends and family—promotes both happiness and health. In massive investigations, some following thousands of people for several years, close relationships have predicted happiness and health in both individualist and collectivist cultures (Brannan et al., 2013; Gable et al., 2012; Rueger et al., 2016). People are less likely to die early if supported by close relationships (Shor et al., 2013). When Brigham Young University researchers combined data from 70 studies of 3.4 million people worldwide, they confirmed a striking effect of social support (Holt-Lunstad et al., 2015). Compared with those who had ample social connections, those who were socially isolated or felt lonely had a 30 percent greater death rate during the 7-year study period. Social isolation's association with risk of death is equivalent to smoking (Holt-Lunstad et al., 2010).

Rubberball/Mark Andersen/Getty Images

Laughter among friends is good medicine Laughter arouses us, massages muscles, and then leaves us feeling relaxed (Robinson, 1983). Humor (though not hostile sarcasm) may defuse stress, ease pain, and strengthen immune activity (Ayan, 2009; Berk et al., 2001; Dunbar et al., 2011; Kimata, 2001). People who laugh a lot have also tended to have lower rates of heart disease (Clark et al., 2001).

To combat social isolation, we need to do more than collect lots of acquaintances. We need people who genuinely care about us (Cacioppo et al., 2014; Hawkley et al., 2008). Some fill this need by connecting with friends, family, co-workers, members of a faith community, or other support groups. Others connect in positive, happy, supportive marriages. One 7-decade-long study found that at age 50, healthy aging was better predicted by a good marriage than by a low cholesterol level (Vaillant, 2002). On the flip side, divorce predicts poor health. In one analysis of 32 studies involving more than 6.5 million people, divorced people were 23 percent more likely to die early (Sbarra et al., 2011). But it’s less marital status than marital *quality* that predicts health—to about the same extent as a healthy diet and physical activity do (Robles, 2015; Robles et al., 2014).

What explains the link between social support and health? Are middle-aged and older adults who live alone more likely to smoke, be obese, and have high cholesterol—and therefore to have a doubled risk of heart attacks (Nielsen et al., 2006)? Or are healthy people simply more sociable? Possibly. But research suggests that social support does have health benefits.

SOCIAL SUPPORT CALMS US AND REDUCES BLOOD PRESSURE AND STRESS HORMONES (Baron et al., 2016; Hostinar et al., 2014; Uchino et al., 1996, 1999). To see if social support might calm people’s response to threats, one research team subjected happily married women, while lying in an fMRI machine, to the threat of electric shock to an ankle (Coan et al., 2006). During the experiment, some women held their husband’s hand. Others held the hand of an unknown person or no hand at all. While awaiting the occasional shocks, women holding their husband’s hand showed less activity in threat-responsive areas. This soothing benefit was greatest for those reporting the highest-quality marriages. People with supportive marriages also had below-average stress hormone levels 10 years later (Slatcher et al., 2015). Even animal support, such as a companionable pet, helps buffer stress (Siegel, 1990).

SOCIAL SUPPORT FOSTERS STRONGER IMMUNE FUNCTIONING

Volunteers in studies of resistance to cold viruses showed this effect (Cohen, 2004; Cohen et al., 1997). Healthy volunteers inhaled nasal drops laden with a cold virus and were quarantined and observed for 5 days. (In these experiments, more than 600 volunteers received $800 each to endure this experience.) Age, race, sex, and health habits being equal, those with close social ties were least likely to catch a cold. People whose daily life included frequent hugs likewise experienced fewer cold symptoms and less symptom severity (Cohen et al., 2015). The cold fact is that the effect of social ties is nothing to sneeze at!

Photos.com/Getty Images

Pets are friends, too Pets can provide social support. Having a pet may increase the odds of survival after a heart attack, relieve depression among people with AIDS, and lower blood pressure and other coronary risk factors (Allen, 2003; McConnell et al., 2011; Wells, 2009). To lower blood pressure, pets are no substitute for effective drugs and exercise. But for people who enjoy animals, and especially for those who live alone, pets are a healthy pleasure (Allen, 2003).

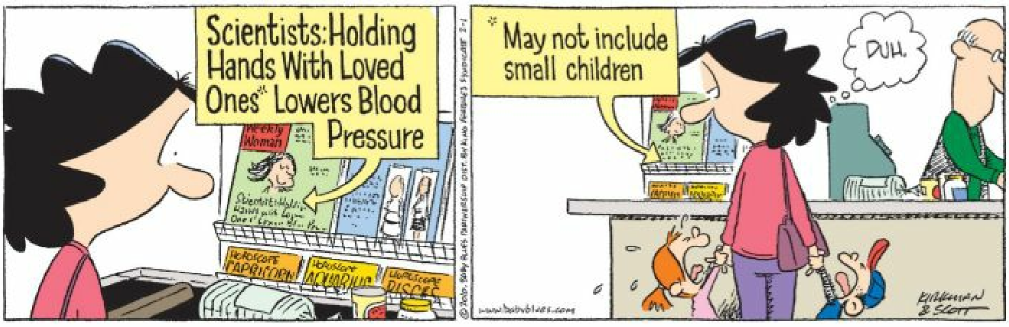
CLOSE RELATIONSHIPS GIVE US AN OPPORTUNITY FOR “OPEN HEART THERAPY”—A CHANCE TO CONFIDE PAINFUL FEELINGS (Frattaroli, 2006). Talking about a stressful event can temporarily arouse us, but in the long run it calms us (Lieberman et al., 2007; Mendolia & Kleck, 1993; Niles et al., 2015). In one study, 33 Holocaust survivors spent two hours recalling their experiences, many in intimate detail never before disclosed (Pennebaker et al., 1989). In the weeks following, most watched a video of their recollections and showed it to family and friends. Those who were most self-disclosing had the most improved health 14 months later. In another study, of surviving spouses of people who had committed suicide or died in car accidents, those who bore their grief alone had more health problems than those who shared it with others (Pennebaker & O’Heeron, 1984). Confiding is good for the body and the soul.

Suppressing emotions can be detrimental to physical health. When psychologist James Pennebaker (1985) surveyed more than 700 undergraduate women, some reported a traumatic sexual experience in childhood. The sexually abused women—especially those who had kept their secret to themselves—reported more headaches and stomach ailments than did other women who had experienced nonsexual traumas, such as parental death or divorce. Another study, of 437 Australian ambulance drivers, confirmed the ill effects of suppressing one’s emotions after witnessing traumas (Wastell, 2002).

> “*Woe to one who is alone and falls and does not have another to help.*”
>
> *Ecclesiastes 4:10*

Even writing about personal traumas in a diary can help (Burton & King, 2008; Kállay, 2015; Lyubomirsky et al., 2006). In an analysis of 633 trauma victims, writing therapy was as effective as psychotherapy in reducing psychological trauma (van Emmerik et al., 2013). In another experiment, volunteers who wrote trauma diaries had fewer health problems during the ensuing 4 to 6 months (Pennebaker, 1990). As one participant explained, “Although I have not talked with anyone about what I wrote, I was finally able to deal with it, work through the pain instead of trying to block it out. Now it doesn’t hurt to think about it.”

If we are aiming to exercise more, eat less, or reach our full academic potential, our social ties can tug us away from or toward our goal. If you are trying to achieve some goal, think about whether your social network will help or hinder you.


Scientists: Holding Hands With Loved Ones* Lowers Blood Pressure
Weekly Woman
Horoscope CAPRICORN
Horoscope AQUARIUS
Horoscope PISCES
* May not include small children
DUH.
www.babyblues.com
Kirkman & Scott

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Reducing Stress

Developing more optimistic thinking, building social support, and having a sense of personal control (Module 29) can help us *experience* less stress and thus improve our health. Moreover, these factors interrelate: People who have been upbeat about themselves and their future have tended also to enjoy health-promoting social ties (Stinson et al., 2008). But sometimes we cannot alleviate stress and simply need to *manage* our stress. Aerobic exercise, relaxation, meditation, and spiritual communities may help us gather inner strength and lessen stress effects.

Aerobic Exercise

44-2 How effective is aerobic exercise as a way to manage stress and improve well-being?

Aerobic exercise is sustained, oxygen-consuming, exertion—such as jogging, swimming, or biking—that increases heart and lung fitness. It’s hard to find bad things to say about exercise. Estimates vary, but moderate exercise adds to your quantity of life—about seven hours longer life for every exercise hour (Lee et al., 2017)—*and* your quality of life, with more energy, better mood, and stronger relationships (Flueckiger et al., 2016; Hogan et al., 2015).

aerobic exercise

sustained exercise that increases heart and lung fitness; also helps alleviate depression and anxiety.

Exercise helps fight heart disease by strengthening the heart, increasing blood flow, keeping blood vessels open, and lowering both blood pressure and the blood pressure reaction to stress (Ford, 2002; Manson, 2002). Compared with inactive adults, people who exercise suffer about half as many heart attacks (Evenson et al., 2016; Visich & Fletcher, 2009).

Dietary fat contributes to clogged arteries, but exercise makes our muscles hungry for those fats and helps clean them out of our arteries (Barinaga, 1997). In one study of over 650,000 American adults, walking 150 minutes per week predicted living 7 more years (Moore et al., 2012). A follow-up study of 1.44 million Americans and Europeans found that exercise predicted "lower risks of many cancer types" (Moore et al., 2016). Regular exercise in later life also predicts better cognitive functioning and reduced risk of neurocognitive disorder and Alzheimer's disease (Kramer & Erickson, 2007).

The genes passed down to us from our distant ancestors were those that enabled the physical activity essential to hunting, foraging, and farming (Raichlen & Polk, 2013). In muscle cells, those genes, when activated by exercise, respond by producing proteins. In the modern inactive person, these genes produce lower quantities of proteins and leave us susceptible to more than 20 chronic diseases, such as type 2 diabetes, coronary heart disease, stroke, and cancer (Booth & Neufer, 2005). Inactivity is thus potentially toxic. Physical activity can weaken the influence of some genetic risk factors. In one analysis of 45 studies, the risk of obesity fell by 27 percent (Kilpeläinen et al., 2012).

Does exercise also boost the spirit? In a 21-country survey of university students, physical exercise was a strong and consistent predictor of life satisfaction (Grant et al., 2009). Americans, Canadians, and Britons who do aerobic exercise at least three times a week manage stress better, exhibit more self-confidence, feel more vigor, and feel less depressed and fatigued than their inactive peers (Rebar et al., 2015; Smits et al., 2011). Going from active exerciser to couch potato can increase the likelihood of depression—by 51 percent in 2 years for the women in one study (Wang, F. et al., 2011). Among people with depression, getting off the couch and into a more physically active life reduces depressive symptoms (Kvam et al., 2016; Snippe et al., 2016). "Exercise has a large and significant antidepressant effect," concluded one digest of 25 controlled studies (Schuch et al., 2016).

But we could state this observation another way: Stressed and depressed people exercise less. These findings are correlations, and cause and effect are unclear. To sort out cause and effect, researchers experiment. They randomly assign stressed, depressed, or anxious people either to an aerobic exercise group or to a control group. Next, they measure whether aerobic exercise (compared with a control activity not involving exercise) produces a change in stress, depression, anxiety, or some other health-related outcome. One classic experiment randomly assigned mildly depressed female college students to three groups. One-third participated in a program of aerobic exercise. Another third took part in a program of relaxation exercises. The remaining third (the control group) formed a no-treatment group (McCann & Holmes, 1984). As **Figure 44.1** shows, 10 weeks later, the women in the aerobic exercise program reported the greatest decrease in depression. Many had, quite literally, run away from their troubles.

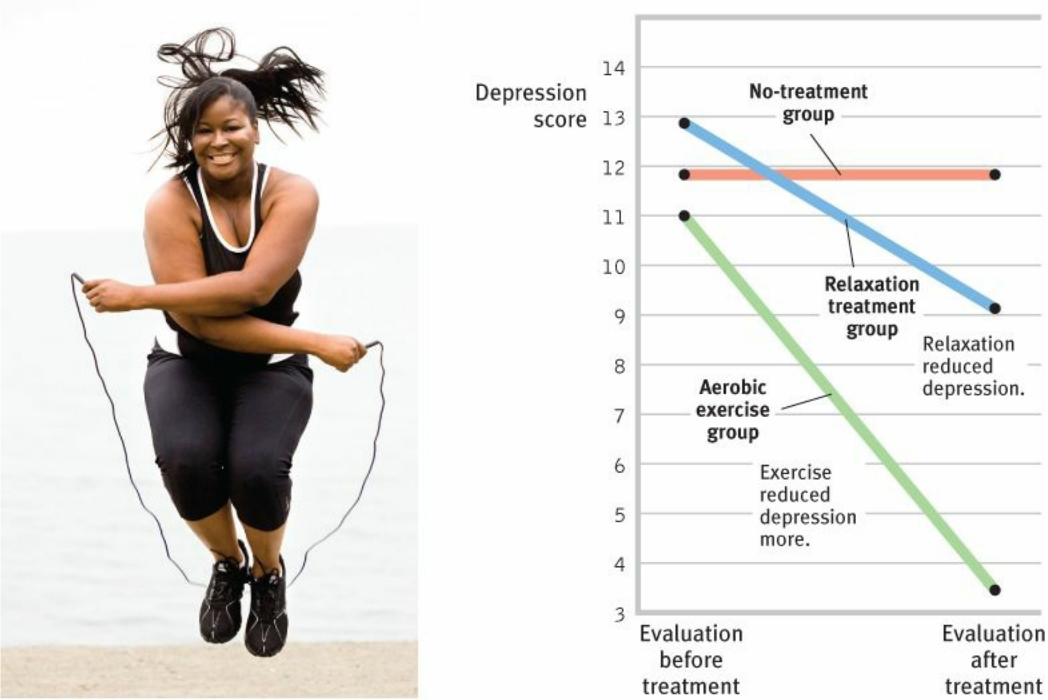


Figure 44.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from McCann & Holmes, 1984.
Photo: Paik Photography/Alamy

Figure 44.1 Aerobic exercise reduces mild depression

Dozens of other experiments and longitudinal studies confirm that exercise prevents or reduces depression and anxiety (Catalan-Matamoros et al., 2016; Conn, 2010; Pinto Pereira et al., 2014). When experimenters randomly assigned depressed people to an exercise group, an antidepressant group, or a placebo pill group, exercise diminished depression as effectively as antidepressants—and with longer-lasting effects (Hoffman et al., 2011).

Vigorous exercise provides a substantial and immediate mood boost (Watson, 2000). Even a 10-minute walk stimulates 2 hours of increased well-being by raising energy levels and lowering tension (Thayer, 1987, 1993). Exercise works its magic in several ways. It increases arousal, thus counteracting depression's low arousal state. It enables muscle relaxation and sounder sleep. Like an antidepressant drug, it orders up mood-boosting chemicals from our body's internal pharmacy—neurotransmitters such as norepinephrine, serotonin, and the endorphins (Jacobs, 1994; Salmon, 2001). What is more, toned muscles filter out depression-causing toxins (Agudelo et al., 2014). Exercise also fosters *neurogenesis*. In mice, exercise causes the brain to produce a molecule that stimulates the production of new, stress-resistant neurons (Hunsberger et al., 2007; Reynolds, 2009; van Praag, 2009).

Left: Kathryn Brownson; Right: Alice DeWall

The mood boost When energy or spirits are sagging, few things reboot the day better than exercising, as I [DM] can confirm from my noontime biking and basketball, and as I [ND] can confirm from my running.

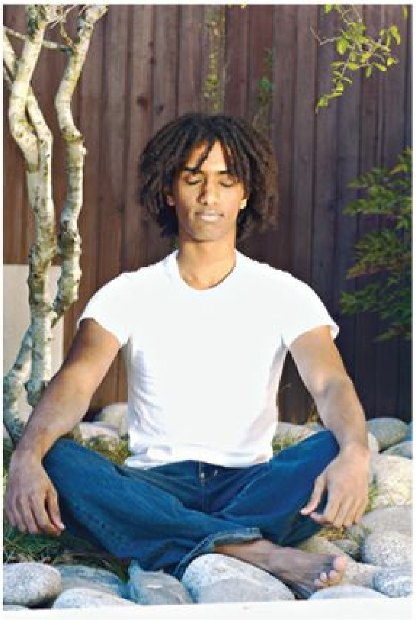
On a simpler level, the sense of accomplishment and improved physique and body image that often accompany a successful exercise routine may enhance one’s self-image, leading to a better emotional state. Frequent exercise is like a drug that prevents and treats disease, increases energy, calms anxiety, and boosts mood—a drug we would all take, if available. Yet few people (only 1 in 4 in the United States) do it (Mendes, 2010).

Relaxation and Meditation

44-3 In what ways might relaxation and meditation influence stress and health?

Knowing the damaging effects of stress, could we learn to counteract our stress responses by altering our thinking and lifestyle? As we learned in Module 28, in the late 1960s, psychologists began experimenting with *biofeedback,* a system of recording, amplifying, and feeding back information about subtle physiological responses, many controlled by the autonomic nervous system. However, a decade of study revealed only limited effectiveness, with biofeedback working best on tension headaches (Miller, 1985; NIH, 1995).

Simple methods of relaxation, which require no expensive equipment, produce many of the results biofeedback once promised. Figure 44.1 pointed out that aerobic exercise reduces depression. But did you notice in that figure that depression also decreased among women in the relaxation treatment group? More than 60 studies have found that relaxation procedures can also help alleviate headaches, hypertension, anxiety, and insomnia (Nestoriuc et al., 2008; Stetter & Kupper, 2002).



Blend Images/Alamy

Such findings would not surprise Meyer Friedman, Ray Rosenman, and their colleagues. They tested relaxation in a program designed to help *Type A* heart attack survivors (who are more prone to heart attacks than their *Type B* peers) reduce their risk of future attacks. They randomly assigned hundreds of middle-aged men to one of two groups. The first group received standard advice from cardiologists about medications, diet, and exercise habits. The second group received similar advice, but they also were taught ways of modifying their lifestyles. They learned to slow down and relax by walking, talking, and eating more slowly. They learned to smile at others and laugh at themselves. They learned to admit their mistakes, to take time to enjoy life, and to renew their religious faith. The training paid off (**Figure 44.2**). During the next 3 years, those who learned to modify their lifestyle had half as many repeat heart attacks as did the first group. This, wrote the exuberant Friedman, was an unprecedented, spectacular reduction in heart attack recurrence. A smaller-scale British study spanning 13 years similarly showed a halved death rate among high-risk people trained to alter their thinking and lifestyle (Eysenck & Grossarth-Maticek, 1991). After suffering a heart attack at age 55, Friedman started taking his own behavioral medicine—and lived to age 90 (Wargo, 2007).

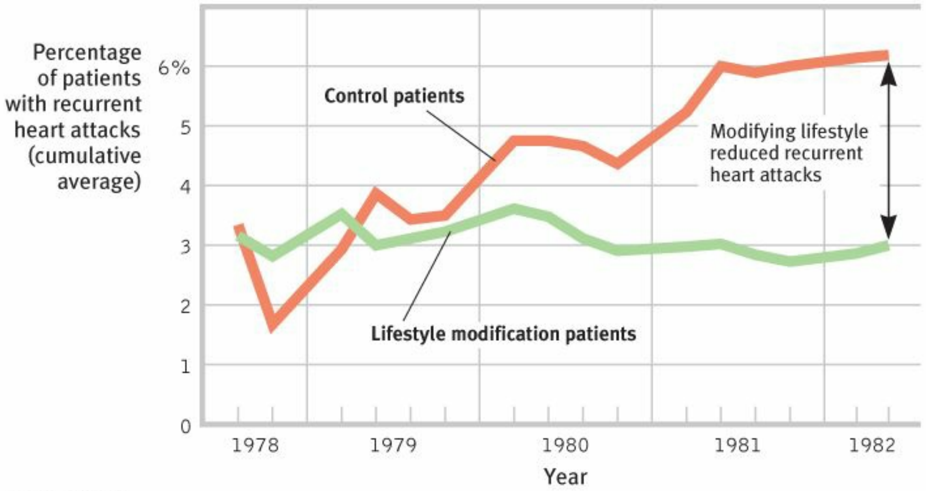


Figure 44.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Friedman & Ulmer, 1984.

Figure 44.2 Recurrent heart attacks and lifestyle modification

The San Francisco Recurrent Coronary Prevention Project offered counseling from a cardiologist to survivors of heart attacks. Those who were also guided in modifying their Type A lifestyle suffered fewer repeat heart attacks.

Time may heal all wounds, but relaxation can help speed that process. In one study, surgery patients were randomly assigned to two groups. Both groups received standard treatment, but the second group also experienced a 45-minute relaxation exercise and received relaxation recordings to use before and after surgery. A week after surgery, patients in the relaxation group reported lower stress and showed better wound healing (Broadbent et al., 2012).

Meditation is a modern practice with a long history. In many world religions, meditation has been used to reduce suffering and improve awareness, insight, and compassion. Numerous studies have confirmed the psychological benefits of different types of meditation (Goyal et al., 2014; Rosenberg et al., 2015; Sedlmeier et al., 2012). These types include **mindfulness meditation**, which today has found a new home in stress management programs. If you were taught this practice, you would relax and silently attend to your inner state, without judging it (Brown et al., 2016; Kabat-Zinn, 2001). You would sit down, close your eyes, and mentally scan your body from head to toe. Zooming in on certain body parts and responses, you would remain aware and accepting. You would also pay attention to your breathing, attending to each breath as if it were a material object.

mindfulness meditation
a reflective practice in which people attend to current experiences in a nonjudgmental and accepting manner.

Practicing mindfulness may lessen anxiety and depression (Goyal et al., 2014). In one study of 1140 people, some received mindfulness-based therapy for several weeks. Others did not. Levels of anxiety and depression were lower among those who received the therapy (Hofmann et al., 2010). Mindfulness practices have also been linked with improved sleep, interpersonal relationships, and immune system functioning (Gong et al., 2016; Rosenkranz et al., 2013; Sedlmeier et al., 2012; Tang et al., 2007). Just a few minutes of daily mindfulness meditation is enough to improve concentration and decision making (Hafenbrack et al., 2014; Rahl et al., 2016).

> “*Sit down alone and in silence. Lower your head, shut your eyes, breathe out gently, and imagine yourself looking into your own heart. . . . As you breathe out, say ‘Lord Jesus Christ, have mercy on me.’ . . . Try to put all other thoughts aside. Be calm, be patient, and repeat the process very frequently.*”
>
> *Gregory of Sinai, died 1346*

So, what’s going on in the brain as we practice mindfulness? Correlational and experimental studies offer three explanations. Mindfulness

- **STRENGTHENS CONNECTIONS AMONG BRAIN REGIONS.** The affected regions are those associated with focusing our attention, processing what we see and hear, and being reflective and aware (Berkovich-Ohana et al., 2014; Ives-Deliperi et al., 2011; Kilpatrick et al., 2011).

- **ACTIVATES BRAIN REGIONS ASSOCIATED WITH MORE REFLECTIVE AWARENESS.** (Davidson et al., 2003; Way et al., 2010). When labeling emotions, mindful people show less activation in the amygdala (a fear-associated brain region) and more activation in the prefrontal cortex, which aids emotion regulation (Creswell et al., 2007; Gotink et al., 2016).
- **CALMS BRAIN ACTIVATION IN EMOTIONAL SITUATIONS.** This lower activation was clear in one study in which participants watched two movies—one sad, one neutral. Those in the control group, who were not trained in mindfulness, showed strong differences in brain activation when watching the two movies. Those who had received mindfulness training showed little change in brain response to the two movies (Farb et al., 2010). Emotionally unpleasant images also trigger weaker electrical brain responses in mindful people than in their less mindful counterparts (Brown et al., 2013). A mindful brain is strong, reflective, and calm.

FYI

And then there are the mystics who seek to use the mind’s power to enable novocaine-free cavity repair. Their aim: transcend dental medication.

Exercise and meditation are not the only routes to healthy relaxation. Massage helps relax both premature infants and those suffering pain, and it relaxes muscles and helps reduce depression (Hou et al., 2010).

Faith Communities and Health

44-4 What is the faith factor, and what are some possible explanations for the link between faith and health?

Religiously active people tend to live longer than those who are not religiously active, a curious correlation called the *faith factor* (Koenig et al., 2012). One study compared the death rates for 3900 people living in two Israeli communities. The first community contained 11 religiously orthodox collective settlements; the second contained 11 matched, nonreligious collective settlements (Kark et al., 1996). Over a 16-year period, “belonging to a religious collective was associated with a strong protective effect” not explained by age or economic differences. In every age group, religious community members were about half as likely to have died as were their nonreligious counterparts. This difference is roughly comparable to the gender difference in mortality. A more recent study followed 74,534 nurses over 20 years. When controlling for various health risk factors, those who attended religious services more than weekly were a third less likely to have died than were nonattenders (Li et al., 2016).

How should we interpret such findings? Correlations are not cause-effect statements, and they leave many factors uncontrolled (Sloan, 2005; Sloan et al., 1999, 2000, 2002). Here is another possible interpretation: Women are more religiously active than men, and women outlive men. Might religious involvement merely reflect this gender-longevity link? Apparently not. One 8-year National Institutes of Health study followed 92,395 women, ages 50 to 79. After controlling for many factors, researchers found that women attending religious services at least weekly experienced an approximately 20 percent reduced risk of death during the study period (Schnall et al., 2010). Moreover, the association between religious involvement and life expectancy is also found among men (Benjamins et al., 2010; McCullough et al., 2000; McCullough & Laurenceau, 2005). A 28-year study that followed 5286 Californians found that, after controlling for age, gender, ethnicity, and education, frequent religious attenders were 36 percent less likely to have died in any year (**Figure 44.3**). In another 8-year controlled study of more than 20,000 people (Hummer et al., 1999), this effect translated into a life expectancy of 83 years for those frequently attending religious services and only 75 years for nonattenders.

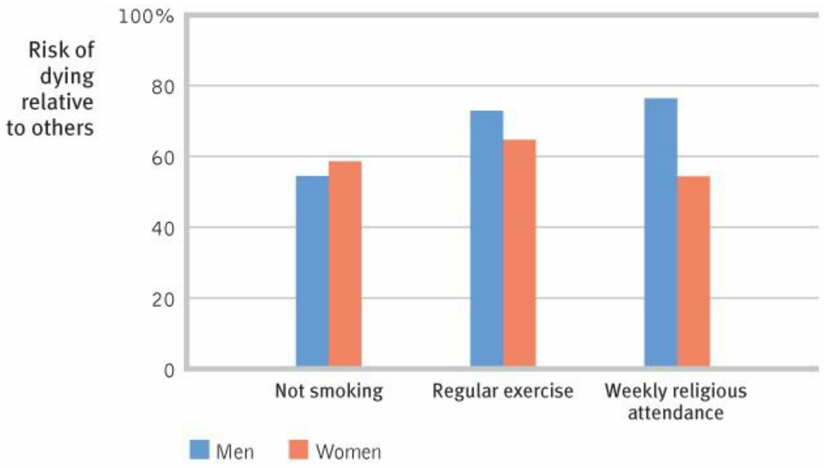


Figure 44.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 44.3 Predictors of longer life: Not smoking, frequent exercise, and regular religious attendance

One 28-year study followed 5286 Alameda, California, adults (Oman et al., 2002; Strawbridge, 1999; Strawbridge et al., 1997). Controlling for age and education, the researchers found that not smoking, regular exercise, and religious attendance all predicted a lowered risk of death in any given year. Women attending weekly religious services, for example, were only 54 percent as likely to die in a typical study year as were nonattenders.

These correlational findings do not indicate that nonattenders can suddenly add 8 years of life if they start attending services and change nothing else. Nevertheless, the findings do indicate that religious involvement, like nonsmoking and exercise, is a *predictor* of health and longevity. Research points to three possible explanations for the religiosity-longevity correlation (**Figure 44.4**):

- **HEALTHY BEHAVIORS.** Religion promotes self-control (DeWall et al., 2014; McCullough & Willoughby, 2009). And that helps explain why religiously active people tend to smoke and drink much less and to have healthier lifestyles (Islam & Johnson, 2003; Koenig & Vaillant, 2009; Masters & Hooker, 2013). In one Gallup survey of 550,000 Americans, 15 percent of the very religious were smokers, as were 28 percent of the nonreligious (Newport et al., 2010). But such lifestyle differences are not great enough to explain the dramatically reduced mortality in the Israeli religious settlements. In American studies, too, about 75 percent of the longevity difference remained when researchers controlled for unhealthy behaviors, such as inactivity and smoking (Musick et al., 1999).

- **SOCIAL SUPPORT.** Could social support explain the faith factor (Ai et al., 2007; Kim-Yeary et al., 2012)? Faith is often a communal experience. To belong to a faith community is to participate in a support network. Religiously active people are there for one another when misfortune strikes. Moreover, religion encourages marriage, another predictor of health and longevity. In the 20-year nurses study, social support was the biggest contributor to the religiosity factor—explaining a fourth of its effect.
- **POSITIVE EMOTIONS.** Even after controlling for social support, gender, unhealthy behaviors, and preexisting health problems, the mortality studies have found that religiously engaged people tend to live longer (Chida et al., 2009). Researchers speculate that religiously active people may benefit from a stable, coherent worldview, a sense of hope for the long-term future, feelings of ultimate acceptance, and the relaxed meditation of prayer or other religious observance. These intervening variables may also help to explain why the religiously active have had healthier immune functioning, fewer hospital admissions, and, for people with AIDS, fewer stress hormones and longer survival (Ironson et al., 2002; Koenig & Larson, 1998; Lutgendorf et al., 2004).

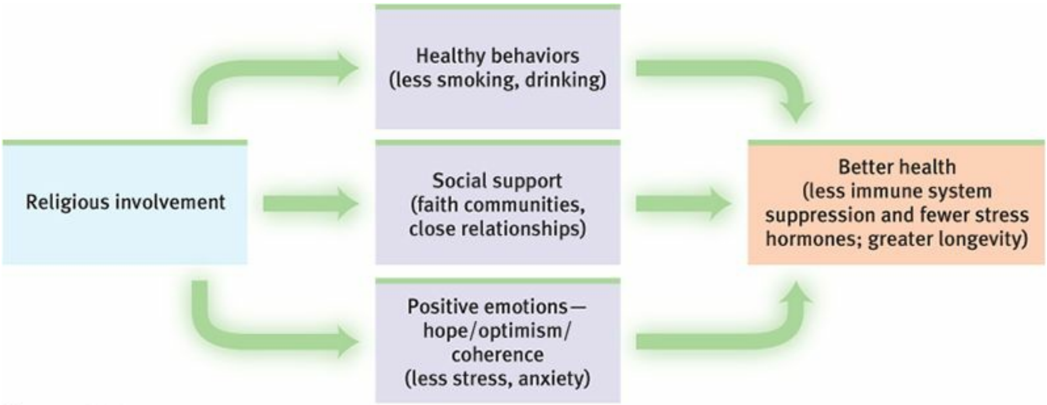

Healthy behaviors
(less smoking, drinking)
Religious involvement
Social support
(faith communities,
close relationships)
Better health
(less immune system
suppression and fewer stress
hormones; greater longevity)
Positive emotions—
hope/optimism/
coherence
(less stress, anxiety)

Figure 44.4
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Figure 44.4 Possible explanations for the correlation between religious involvement and health/longevity

✓ Check Your Understanding

Ask Yourself

- What techniques mentioned in this module do you use to manage stress and promote health? In what ways might you improve your stress management and increase well-being?

Test Yourself

- What are some of the tactics we can use to successfully manage the stress we cannot avoid?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Happiness

44-5 What is the *feel-good, do-good phenomenon,* what is the focus of positive psychology research, and what are the factors that affect our happiness levels?

People aspire to, and wish one another, health and happiness. And for good reason. Our state of happiness or unhappiness colors everything. Happy people perceive the world as safer. Their eyes are drawn toward emotionally positive information (Raila et al., 2015). They are more confident and decisive, and they cooperate more easily. They rate job applicants more favorably, savor their positive past experiences without dwelling on the negative, and are more socially connected. They live healthier and more energized and satisfied lives (Boehm et al., 2015a; De Neve et al., 2013; Stellar et al., 2015). And they are more generous (Boenigk & Mayr, 2016). The simple conclusion: *Moods matter*. When you are gloomy, life as a whole seems depressing and meaningless—and you think more skeptically and attend more critically to your surroundings. Let your mood brighten and your thinking broadens, becoming more playful and creative (Baas et al., 2008; Forgas, 2008; Fredrickson, 2013).

College and university students' happiness helps predict their future life course. One study showed that the happiest 20-year-olds were later more likely to marry and less likely to divorce (Stutzer & Frey, 2006). In another study, which surveyed thousands of U.S. college students in 1976 and restudied them at age 37, happy students had gone on to earn significantly more money than their less-happy-than-average peers (Diener et al., 2002). When we are happy, our relationships, self-image, and hopes for the future also seem more promising.

Moreover—and this is one of psychology's most consistent findings—happiness doesn't just feel good, it *does* good. In study after study, a mood-boosting experience such as recalling a happy event has made people more likely to give money, pick up someone's dropped papers, volunteer time, and do other good deeds. Psychologists call it the **feel-**

good, do-good phenomenon (Salovey, 1990).

feel-good, do-good phenomenon

people’s tendency to be helpful when in a good mood.

The reverse is also true: Doing good also promotes good feeling. One survey of more than 200,000 people in 136 countries found that, nearly everywhere, people report feeling happier after spending money on others rather than on themselves (Aknin et al., 2013; Dunn et al., 2014). Kidney donation leaves donors feeling good (Brethel-Haurwitz & Marsh, 2014). Young children also show more positive emotion when they give, rather than receive, gifts (Aknin et al., 2015). Why does doing good feel so good? One reason is that it strengthens our social relationships (Aknin & Human, 2015; Yamaguchi et al., 2015). Some happiness coaches harness this *do-good, feel-good phenomenon* as they assign people to perform a daily “random act of kindness” and to record the results.

Positive Psychology

William James was writing about the importance of happiness (“the secret motive for all [we] do”) as early as 1902. By the 1960s, the *humanistic psychologists* were interested in advancing human fulfillment. In the twenty-first century, under the leadership of American Psychological Association past-president Martin Seligman, **positive psychology** is using scientific methods to study human flourishing. This young subfield includes studies of **subjective well-being**—our feelings of happiness (sometimes defined as a high ratio of positive to negative feelings) or our sense of satisfaction with life.

positive psychology

the scientific study of human flourishing, with the goals of discovering and promoting strengths and virtues that help individuals and communities to thrive.

subjective well-being

self-perceived happiness or satisfaction with life. Used along with measures of objective well-being (for example, physical and economic indicators) to evaluate people's quality of life.

Courtesy of Martin Seligman

Martin E. P. Seligman "The main purpose of a positive psychology is to measure, understand, and then build the human strengths and the civic virtues."

Taken together, satisfaction with the past, happiness with the present, and optimism about the future define the positive psychology movement's first pillar: *positive well-being.* Seligman views happiness as a by-product of a pleasant, engaged, and meaningful life.

Positive psychology is about building not just a pleasant life, says Seligman, but also a good life that engages one's skills, and a meaningful life that points beyond oneself. Thus, the second pillar, *positive character*, focuses on exploring and enhancing creativity, courage, compassion, integrity, self-control, leadership, wisdom, and spirituality.

The third pillar, *positive groups, communities, and cultures*, seeks to foster a positive social ecology. This includes healthy families, communal neighborhoods, effective schools, socially responsible media, and civil dialogue.

"Positive psychology," Seligman and colleagues have said (2005), "is an umbrella term for the study of positive emotions, positive character traits, and enabling institutions." Its focus differs from psychology's traditional interests in understanding and alleviating negative states—abuse and anxiety, depression and disease, prejudice and poverty. Indeed, psychology articles published since 1887 on depression have outnumbered those related to happiness by 15 to 1.

In ages past, times of relative peace and prosperity have enabled cultures to turn their attention from repairing weakness and damage to promoting what Seligman (2002) has called “the highest qualities of life.” Prosperous fifth-century Athens nurtured philosophy and democracy. Flourishing fifteenth-century Florence nurtured great art. Victorian England, flush with the bounty of the British Empire, nurtured honor, discipline, and duty. In this millennium, Seligman believes, thriving Western cultures have a parallel opportunity to create, as a “humane, scientific monument,” a more positive psychology, concerned not only with weakness and damage but also with strength and virtue. Thanks to his leadership, and to more than $200 million in funding, the movement has gained strength, with supporters in 77 countries (IPPA, 2017; Seligman, 2016).

The Short Life of Emotional Ups and Downs

Are some days of the week happier than others? In what may be psychology’s biggest-ever data sample, social psychologist Adam Kramer (at my [DM’s] request and in cooperation with Facebook) did a naturalistic observation of emotion words in *billions* of status updates. After eliminating exceptional days, such as holidays, he tracked the frequency of positive and negative emotion words by day of the week. The days with the most positive moods? Friday and Saturday (**Figure 44.5**). Similar analyses of questionnaire responses and 59 million Twitter messages found Friday to Sunday the week’s happiest days (Golder & Macy, 2011; Helliwell & Wang, 2015; Young & Lim, 2014). For you, too?

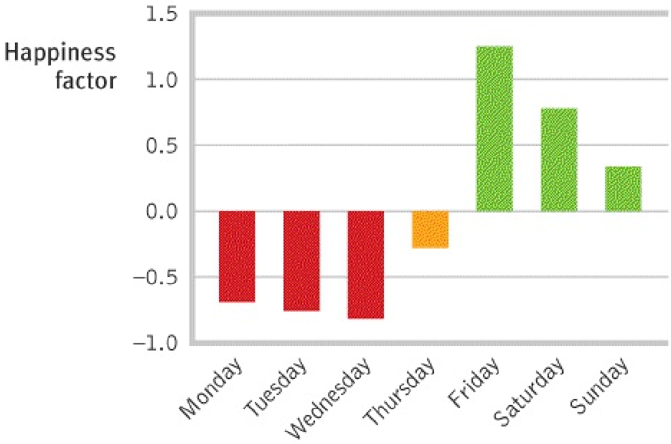

Figure 44.5
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Figure 44.5 Using web science to track happy days

Adam Kramer (2010) tracked positive and negative emotion words in many "billions" (the exact number is proprietary information) of status updates of U.S. Facebook users between September 7, 2007, and November 17, 2010.

Courtesy of Anna Putt

Human resilience Seven weeks after her 1994 wedding, Anna Putt of South Midlands, England, shown here with her husband, Des, suffered a brain-stem stroke that left her "locked-in." For months after, she recalled, "I was paralyzed from the neck down and was unable to communicate. These were VERY frightening times. But with encouragement from family, friends, faith, and medical staff, I tried to keep positive." In the ensuing three years, she became able to "talk" (by nodding at letters), to steer an electric wheelchair with her head, and to use a computer (with head movements that guide a cursor). Despite her paralysis, she has reported, "I enjoy going out in the fresh air. My motto is 'Don't look back, move forward.' God would not want me to stop trying and I have no intention of doing so. Life is what you make of it!"

Over the long run, our emotional ups and downs tend to balance out, even over the course of the day. Positive emotion rises over the early to middle part of most days and then drops off (Kahneman et al., 2004; Watson, 2000). A stressful event—an argument, a team loss, a poor test result—can trigger a bad mood. No surprise there. But by the next day, the gloom nearly always lifts (Affleck et al., 1994; Bolger et al., 1989; Stone & Neale, 1984). Our overall judgments of our lives often show lingering effects of good or bad events, but our daily moods typically rebound (Luhmann et al., 2012). If anything, people tend to bounce back from a bad day to a *better*-than-usual good mood the following day.

Worse events—the loss of a pet or a circle of friends—can drag us down for longer periods (Infurna & Luthar, 2016). But eventually, our bad mood usually ends. Those involved in romantic relationships expect their lives would be deflated by a breakup. Actually, after a recovery period, their happiness level is about the same as for those who don’t break up (Gilbert et al., 1998).

Grief over the loss of a loved one or anxiety after a severe trauma (such as child abuse, rape, or the terrors of war) can linger. But usually, even tragedy is not permanently depressing. People who become blind or paralyzed may not completely recover their previous well-being, but those with an agreeable personality usually recover near-normal levels of day-to-day happiness (Boyce & Wood, 2011; Hall et al., 1999). So do those who count their blessings and remain optimistic in the wake of a school shooting or terrorist bombing (Birkeland et al., 2016; Vieselmeyer et al., 2017). Even if you lose the use of all four limbs, explained psychologist Daniel Kahneman (2005a), “you will gradually start thinking of other things, and the more time you spend thinking of other things the less miserable you are going to be.” Contrary to what many people believe, even most patients “locked-in” a motionless body do not indicate they want to die (Bruno et al., 2008, 2011; Nizzi et al., 2012; Smith & Delargy, 2005).

> “*Weeping may tarry for the night, but joy comes with the morning.*”
>
> *Psalm 30:5*

The surprising reality: *We overestimate the duration of our emotions and underestimate our resiliency and capacity to adapt.* (As one who inherited hearing loss with a trajectory toward that of my mother, who spent the last 13 years of her life completely deaf, I [DM] take heart from these findings.)

Two Psychological Phenomena: Adaptation and Comparison

Would you be happier if you made more money? In a 2006 Gallup poll, 73 percent of Americans thought they would be. How important is "being very well off financially"? "Very important" or "essential," say 82 percent of entering U.S. college students (Eagen et al., 2016). Money does buy happiness, up to a point, especially for people during their midlife working years (Cheung & Lucas, 2015). Moreover, people in rich countries are happier than those in poor countries (Diener & Tay, 2015). As Australian data confirm, the power of more money to increase happiness is strongest at low incomes (Cummins, 2006). A $1000 annual wage increase does a lot more for the average person in Malawi than for the average person in Switzerland.

But once we have enough money for comfort and security, piling up more and more matters less and less. For example, consider this: During the last half-century, the average U.S. citizen's buying power almost tripled—enabling larger homes and twice as many cars per person, not to mention iPads and smart phones. Did it also buy more happiness? As **Figure 44.6** shows, American have become no happier. In 1957, some 35 percent said they were "very happy," as did slightly fewer—30 percent—in 2016. Much the same has been true of Europe, Canada, Australia, and Japan, where increasing real incomes have *not* produced increasing happiness (Australian Unity, 2008; Diener & Biswas-Diener, 2008; Di Tella & MacCulloch, 2010; Zuzanek, 2013). Ditto China, where living standards have risen but life satisfaction has not (Davey & Rato, 2012; Easterlin et al., 2012). These findings lob a bombshell at modern materialism: *Economic growth in affluent countries has provided no apparent boost to people's morale or social well-being.*

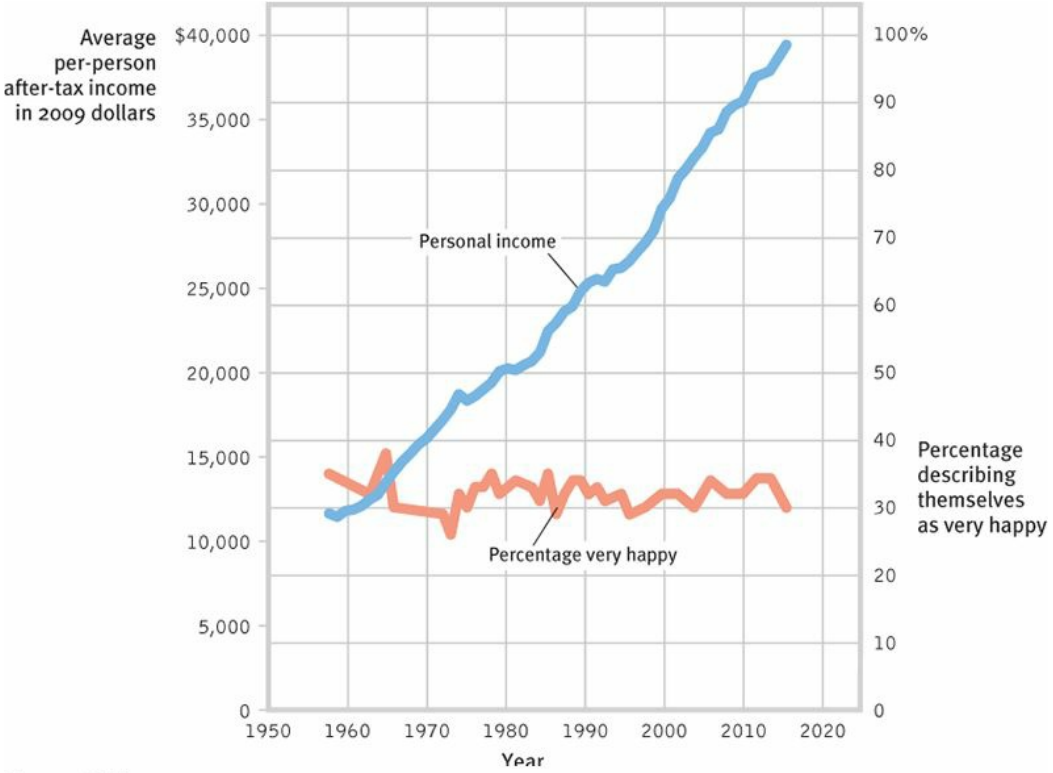

Figure 44.6

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Figure 44.6 Does money buy happiness?

It surely helps us to avoid certain types of pain. Yet, though average buying power has almost tripled since the 1950s, Americans' reported happiness has remained almost unchanged. (Happiness data from National Opinion Research Center surveys; income data from *Historical Statistics of the United States* and *Economic Indicators*.)

Two psychological principles explain why, for those who are not poor, more money buys little more than temporary happiness and why our emotions seem attached to elastic bands that pull us back from highs or lows. In its own way, each principle suggests that happiness is relative.

Happiness Is Relative to Our Own Experience

The **adaptation-level phenomenon** describes our tendency to judge various stimuli in comparison with our past experiences. As psychologist Harry Helson (1898–1977) explained, we adjust our *neutral* levels—the points at which sounds seem neither loud nor soft, temperatures neither hot nor cold, events neither pleasant nor unpleasant—based on our experience.

We then notice and react to variations up or down from these levels. Thus, after an initial surge of pleasure, improvements become our “new normal,” and we then require something even better to give us a boost of happiness.

adaptation-level phenomenon

our tendency to form judgments (of sounds, of lights, of income) relative to a neutral level defined by our prior experience.

People who have experienced a recent windfall—from a lottery, an inheritance, or a surging economy—typically feel elated (Diener & Oishi, 2000; Gardner & Oswald, 2007). So would you, if you woke up tomorrow to your utopia—perhaps a world with no worries, no ills, and perfect test scores. But eventually you would adapt to this new normal. Before long, you would again sometimes feel gratified (when events exceed your expectations) and sometimes feel deprived (when they fall below). *The point to remember:* Feelings of satisfaction and dissatisfaction, success and failure are judgments we make based partly on expectations formed by our recent experience (Rutledge et al., 2014). Satisfaction, as Richard Ryan (1999) said, “has a short half-life.” Ditto disappointment, which means that you may bounce back from a setback or from your team’s defeat sooner than you expect.

> “*I have a ‘fortune cookie maxim’ that I’m very proud of: Nothing in life is quite as important as you think it is while you are thinking about it. So, nothing will ever make you as happy as you think it will.*”
>
> *Nobel laureate psychologist Daniel Kahneman, Gallup interview, “What Were They Thinking?” 2005*

Happiness Is Relative to Others’ Success

We are always comparing ourselves with others. And whether we feel good or bad depends on who those others are (Lyubomirsky, 2001). We are slow-witted or clumsy only when others are smarter or more agile.

When we sense that we are worse off than others with whom we compare ourselves, we experience **relative deprivation**. Satisfaction stems less from our income, for example, than from our income rank (Boyce et al., 2010). Better to someday make $50,000 when others make $25,000 than to make $100,000 when friends, neighbors, and co-workers make $200,000 (Solnick & Hemenway, 1998, 2009).

relative deprivation
the perception that one is worse off relative to those with whom one compares oneself.

Over the last half-century, income inequality in Western countries has increased. The rising economic tide shown in Figure 44.6 has lifted the yachts more than the rowboats. And there is some evidence that inequality is socially toxic. Places with great inequality have higher crime rates, obesity, anxiety, and drug use, and lower life expectancy (Burkhauser et al., 2016; Ratcliff, 2013; Wilkinson & Pickett, 2009). Times and places with greater income inequality also tend to be less happy—a result that people's social comparisons help explain (Cheung & Lucas, 2016; Helliwell et al., 2013; Roth et al., 2016).

FYI

The effect of comparison with others helps explain why students tend to have a higher academic self-concept if they attend a school where most other students are not exceptionally able (Marsh & Parker, 1984; Rogers & Feller, 2016; Salchegger, 2016). Imagine being near the top of your graduating class. You might feel inferior or discouraged upon entering a college or university where all students were near the top of their class.

Just as comparing ourselves with those who are better off creates envy, so counting our blessings as we compare ourselves with those worse off boosts our contentment. In one study, university women considered others' deprivation and suffering (Dermer et al., 1979). They viewed vivid depictions of grim city life in 1900. They imagined and then wrote about various personal tragedies, such as being burned and disfigured. Later, the women expressed greater satisfaction with their own lives. Similarly, when mildly depressed people have read about someone who was even more depressed, they felt somewhat better (Gibbons, 1986). “I cried because I had no shoes,” states a Persian saying, “until I met a man who had no feet.”

> “*Comparison is the thief of joy.*”
>
> *Attributed to Theodore Roosevelt*

What Predicts Our Happiness Levels?

44-6 What predicts happiness, and how can we be happier?

Happy people share many characteristics (**Table 44.1**). But why are some people normally so joyful and others so somber? Here, as in so many other areas, the answer is found in the interplay between nature and nurture.

TABLE 44.1 Happiness Is . . .

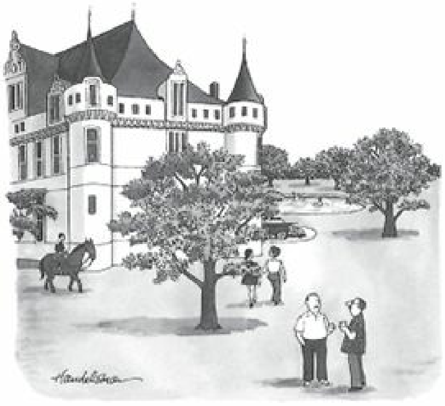
Researchers Have Found That Happy People Tend to	However, Happiness Seems Not Much Related to Other Factors, Such as
Have high self-esteem (in individualist countries).	Age.
Be optimistic, outgoing, and agreeable.	Gender (women are more often depressed, but also more often joyful).
Have close, positive, and lasting relationships.	Physical attractiveness.
Have work and leisure that engage their skills.	

Have an active religious faith (especially in more religious cultures).	
Sleep well and exercise.	

Information from De Neve & Cooper (1998); Diener et al. (2003, 2011); Headey et al. (2010); Lucas et al. (2004); Myers (1993, 2000); Myers & Diener (1995, 1996); Steel et al. (2008). Veenhoven (2014, 2015) offers a database of 13,000+ correlates of happiness at WorldDatabaseofHappiness.eur.nl.

Genes matter. In one analysis of over 55,000 identical and fraternal twins, 36 percent of the differences among people’s happiness ratings was *heritable*—attributable to genes (Bartels, 2015). Even identical twins raised apart are often similarly happy. Moreover, researchers are now drilling down to identify how specific genes influence our happiness (De Neve et al., 2012; Fredrickson et al., 2013).

But our personal history and our culture matter, too. On the personal level, as we have seen, our emotions tend to balance around a level defined by our experience. On the cultural level, groups vary in the traits they value. Self-esteem and achievement matter more in Western cultures, which value individualism. Social acceptance and harmony matter more in communal cultures such as Japan, which stress family and community (Diener et al., 2003; Fulmer et al., 2010; Uchida & Kitayama, 2009).



The Cartoon Bank/Conde Nast Publications

“I could cry when I think of the years I wasted accumulating money, only to learn that my cheerful disposition is genetic.”

Depending on our genes, our outlook, and our recent experiences, our happiness seems to fluctuate around a “happiness set point,” which disposes some people to be ever upbeat and others more negative. Even so, after following thousands of lives over two decades, researchers have determined that our satisfaction with life can change (Lucas & Donnellan, 2007). Happiness rises and falls, and can be influenced by factors that are under our control (Layous & Lyubomirsky, 2014; Nes et al., 2010). See **Table 44.2** for research-based suggestions for improving your mood and increasing your satisfaction with life.

TABLE 44.2 Evidence-Based Suggestions for a Happier Life

- ***Take control of your time.*** Happy people feel in control of their lives: Set goals and divide them into daily aims. We all tend to overestimate how much we will accomplish in any given day, but the good news is that we generally *underestimate* how much we can accomplish in a year, given just a little daily progress.
- ***Act happy.*** Research shows that people who are manipulated into a smiling expression feel better. So put on a happy face. Talk *as if* you feel positive self-esteem, are optimistic, and are outgoing. We can often act our way into a happier state of mind.
- ***Seek work and leisure that engage your skills.*** Happy people often are in a zone called *flow*—absorbed in tasks that challenge but don’t overwhelm them. Passive forms of leisure (watching TV) often provide less flow experience than exercising, socializing, or expressing artistic interests.
- ***Buy shared experiences rather than things.*** Money buys more happiness when spent on experiences, especially on socially shared experiences, that you look forward to, enjoy, remember, and talk about (Caprariello & Reis, 2013; Carter & Gilovich, 2010; Kumar & Gilovich, 2013, 2015).
- ***Join the “movement” movement.*** Aerobic exercise can relieve mild depression and anxiety as it promotes health and energy. Sound minds reside in sound bodies.
- ***Give your body the sleep it wants.*** Happy people live active lives yet reserve time for renewing sleep and solitude. Sleep debt results in fatigue, diminished alertness, and gloomy moods. If you sleep now, you’ll smile later.
- ***Give priority to close relationships.*** Compared with unhappy people, happy people engage in less superficial small talk and more meaningful conversations (Mehl et al., 2010). So resolve to nurture your closest relationships by *not* taking your loved ones for granted: Give them the sort of kindness and affirmation you give others. Relationships matter.
- ***Focus beyond self.*** Reach out to those in need. Perform acts of kindness. Happiness increases helpfulness, but doing good also makes us feel good.

- ***Count your blessings and record your gratitude.*** Keeping a gratitude journal heightens well-being (Davis et al., 2016). Take time to savor positive experiences and achievements, and to appreciate why they occurred (Sheldon & Lyubomirsky, 2012). Express your gratitude to others.
- ***Nurture your spiritual self.*** For many people, faith provides a support community, a reason to focus beyond self, and a sense of purpose and hope. That helps explain why people active in faith communities report greater-than-average happiness and often cope well with crises.

Source: Digested from David G. Myers, *The Pursuit of Happiness* (Harper).

If we can enhance our happiness on an *individual* level, could we use happiness research to refocus our *national* priorities more on the pursuit of happiness? Many psychologists believe we could. Happy societies are not only prosperous, but also places where people trust one another, feel free, and enjoy close relationships (Helliwell et al., 2013; Oishi & Schimmack, 2010a). Thus, in debates about the minimum wage, economic inequality, tax rates, divorce laws, health care, and city planning, people’s psychological well-being can be a consideration. Many political leaders agree: 43 nations have begun measuring their citizens’ well-being (Diener et al., 2015). Britain’s Annual Population Survey, for example, asks its citizens how satisfied they are with their lives, how worthwhile they judge their lives, and how happy and how anxious they felt yesterday (ONS, 2015).

RubberBall Selects/Alamy

✓ Check Your Understanding

Ask Yourself

- If we learn our emotional responses, we may be able to learn new responses to replace old ones. Would you like to change any of your emotional responses? Do you feel you too often expect things to go badly, for instance? How might you go about changing your behavior or your thinking in order to change your emotional reactions?

Test Yourself

- Which of the following factors does NOT predict self-reported happiness?

  a. Age
  b. Personality traits
  c. Sleep and exercise
  d. Active religious faith
  e. Engaging work and leisure

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 44 REVIEW

44-1 What are the links among basic outlook on life, social support, and stress and health?

- Studies of people with an optimistic outlook show that their immune system is stronger, their blood pressure does not increase as sharply in response to stress, their recovery from heart bypass surgery is faster, and their life expectancy is longer.
- Social support promotes health by calming us, by reducing blood pressure and stress hormones, and by fostering stronger immune functioning. We can significantly reduce our stress and increase our health by building and maintaining relationships with family and friends, and by finding meaning even in difficult times.

44-2 How effective is aerobic exercise as a way to manage stress and improve well-being?

- *Aerobic exercise* is sustained, oxygen-consuming activity that increases heart and lung fitness.
- It increases arousal, leads to muscle relaxation and sounder sleep, triggers the production of neurotransmitters, and enhances self-image. It can relieve depression and is associated with longer life and better cognitive functioning in later life.

44-3 In what ways might relaxation and meditation influence stress and health?

- Relaxation and meditation have been shown to reduce stress by relaxing muscles, lowering blood pressure, improving immune functioning, and lessening anxiety and depression. *Mindfulness meditation* is a reflective practice of attending to current experiences in a nonjudgmental and accepting manner. Massage therapy also relaxes muscles and reduces depression.

44-4 What is the faith factor, and what are some possible explanations for the link between faith and health?

- The faith factor is the finding that religiously active people tend to live longer than those who are not religiously active. Possible explanations may include the effect of intervening variables, such as the healthy behaviors, social support, or positive emotions often found among people who regularly attend religious services.

44-5 What is the *feel-good, do-good phenomenon,* what is the focus of positive psychology research, and what are the factors that affect our happiness levels?

- A good mood brightens people’s perceptions of the world. Happy people tend to be healthy, energized, and satisfied with life, which makes them more willing to help others (the *feel-good, do-good phenomenon*).
- *Positive psychologists* use scientific methods to study human flourishing, with the goals of discovering and promoting strengths and virtues that help individuals and communities to thrive.
- *Subjective well-being* is your perception of being happy or satisfied with life.
- The moods triggered by good or bad events seldom last beyond that day. Even significant good events, such as sudden wealth, seldom increase happiness for long.
- Happiness is relative to our own experiences (the *adaptation-level phenomenon*) and to others’ success (the *relative deprivation* principle).

44-6 What predicts happiness, and how can we be happier?

- Some individuals seem genetically predisposed to be happier than others. Cultures, which vary in the traits they value and the behaviors they expect and reward, also influence personal levels of happiness.

- Tips for increasing happiness levels: Take charge of your schedule, act happy, seek meaningful work and leisure, buy shared experiences rather than things, exercise, sleep enough, foster friendships, focus beyond the self, and nurture gratitude and spirituality.

Multiple-Choice Questions

1. Which of the following has shown effectiveness in improving sleep, reducing depression, and increasing heart and lung fitness?

a. Meditation
b. Aerobic exercise
c. Religious involvement
d. Subjective well-being
e. Social support

2. Seligman’s positive psychology seeks to

a. enable people to be happy all the time.
b. treat stress with medication.
c. enable people to flourish.
d. examine the biological systems affected by stressful events.
e. reduce daily hassles in people’s lives.

3. Which of the following is an example of the feel-good, do-good phenomenon?

a. Anagha tries to keep her 2-year-old son from becoming upset for any reason.
b. Niko is praised by his teacher and later volunteers to help his mother clean the garage.
c. Carson feels satisfied after helping the ecology club pick up trash around the school.
d. Maggie’s parents double her allowance when she is nice to her sister all day.
e. Rowen is glad to finally be over the flu so he can return to his

volunteer work.

4. Which of the following accurately represents the relationship between income and happiness?

a. Rapidly increasing income is associated with a slight decrease in happiness because of relative deprivation.
b. Increased income increases happiness equally for almost everybody.
c. There is no relationship between income and happiness.
d. Gradually increasing income is associated with a slight decrease in happiness because of the adaptation-level phenomenon.
e. Increased income increases happiness for people who don’t have enough money to meet their basic needs.

Practice FRQs

1. Sarah has just joined a new faith community. Describe three long-term benefits that she might experience as a result of her membership.

Answer

1 point: Sarah may exhibit healthier behaviors and live longer. People who attend religious services smoke and drink less and have greater longevity. Page 471

1 point: As a part of a faith community, Sarah may have a greater support network than those who do not regularly attend religious services. Page 472

1 point: Sarah may experience more positive emotions than those who do not attend services, and she may see life more optimistically. Page 472

2. TJ wishes to live a happy and fulfilling life. How might the following hinder his happiness?

- Adaptation-level phenomenon

- Relative deprivation

(2 points)

UNIT VIII REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

motivation, p. 402
instinct, p. 402
physiological need, p. 403
drive-reduction theory, p. 403
homeostasis, p. 403
incentive, p. 403
Yerkes-Dodson law, p. 404
hierarchy of needs, p. 405
glucose, p. 409
set point, p. 411
basal metabolic rate, p. 411
obesity, p. 414
asexual, p. 418
testosterone, p. 418
estrogens, p. 418
sexual response cycle, p. 419
refractory period, p. 420
affiliation need, p. 423
ostracism, p. 425
narcissism, p. 427
achievement motivation, p. 428
grit, p. 429
emotion, p. 433
James-Lange theory, p. 433
Cannon-Bard theory, p. 433
two-factor theory, p. 434

polygraph, p. 439
facial feedback effect, p. 447
behavior feedback effect, p. 448
stress, p. 450
general adaptation syndrome (GAS), p. 454
tend-and-befriend response, p. 455
health psychology, p. 456
psychoneuroimmunology, p. 456
coronary heart disease, p. 459
Type A, p. 459
Type B, p. 459
catharsis, p. 460
aerobic exercise, p. 467
mindfulness meditation, p. 470
feel-good, do-good phenomenon, p. 473
positive psychology, p. 473
subjective well-being, p. 473
adaptation-level phenomenon, p. 476
relative deprivation, p. 476

KEY CONTRIBUTORS TO REMEMBER

Abraham Maslow, p. 405
Alfred Kinsey, p. 419
William Masters, p. 419
Virginia Johnson, p. 419
William James, p. 433
Walter Cannon, p. 433
Stanley Schachter, p. 434
Robert Zajonc, p. 434
Joseph LeDoux, p. 435

Richard Lazarus, p. 435

Paul Ekman, p. 445

Hans Selye, p. 454

Martin Seligman, p. 473

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. Cylee is thirsty and takes a drink. Her motivation to reduce the need for water is best explained by (the)

a. instinct theory.
b. drive-reduction theory.
c. achievement motivation.
d. arousal theory.
e. hierarchy of needs.

2. Attempts to control social behavior by using the punishing effects of isolation is an example of

a. the general adaptation syndrome.
b. ostracism.
c. the behavior feedback effect.
d. wanting to belong.
e. the tend-and-befriend response.

3. Marcelo has a good job, a nice house, and plenty of food. On weekends, he skydives for fun. His weekend behavior is best explained by which of the following theories?

a. Incentive
b. Drive-reduction
c. Instinct
d. Arousal
e. Two-factor

4. Thom has been on a diet for several months and has lost 50 pounds. What is happening to the fat cells in his body?

a. The number of fat cells is increasing.
b. The number of fat cells is decreasing.
c. Fat cells are storing excess glucose due to his reduced food intake.
d. The number of fat cells is remaining constant.
e. The fat cells are dividing to increase the number of them available for fat storage.

5. When individuals were placed on a semistarvation diet, researchers found that these individuals

a. became obsessed with physical exercise.
b. were more interpersonally outgoing.
c. became more energetic.
d. were in a state of homeostasis.
e. lost interest in social activities.

6. Which of the following is the best biological explanation for why the human body stores fat?

a. Fat signals affluence and social status.
b. Fat is a fuel reserve during periods when food is scarce.
c. Fat is a display of abundant food sources.
d. Fat keeps the body warm in winter climates.
e. Fat contributes to the global epidemic of diabetes.

7. What do we call a need or desire that energizes and directs behavior?

a. Incentive
b. Stress
c. Emotion
d. Motivation
e. Instinct

8. Which of the following would be most difficult to explain using Maslow's hierarchy of needs?

a. A person who moves to a new city gets an apartment before beginning to make friends.
b. A very hungry reality show contestant searches for food before trying to win a competition.
c. A professor spends time socially with her colleagues before she works on her own research.
d. An artist works to win a local award before spending time on his own personal projects.
e. An athlete follows a “no pain, no gain” motto rather than stopping for rest and nourishment.

9. A hungry person eats in order to maintain an internal balance known as

a. hierarchy of needs.
b. basal metabolic rate.
c. homeostasis.
d. instinct.
e. motivation.

0. A person who eats excessively and never seems to feel full may have which of the following conditions?

a. Tumor in the hypothalamus
b. Too much insulin
c. Tumor in the hippocampus
d. Stomach bypass surgery
e. Too much of the hormone PYY

1. According to the Yerkes-Dodson law

a. performance on an easy task is best when pressure is low.
b. performance is generally best when pressure is low.
c. performance on a difficult task is best when pressure is high.
d. performance is generally best when there is a moderate amount of pressure.
e. difficult tasks get easier with time.

2. Emotions are a mix of consciously experienced thoughts, expressive behaviors, and physiological arousal. Which theory emphasized the importance of cognition in emotion?

a. Facial feedback theory
b. James-Lange theory
c. Arousal and performance theory
d. Fight-or-flight theory
e. Schachter-Singer two-factor theory

3. Research on facial expressions and gestures has found that

a. facial expressions and gestures both tend to be culture-specific.
b. facial expressions and gestures both tend to be universally understood.
c. facial expressions tend to be culture-specific, and gestures tend to be universally understood.
d. facial expressions tend to be universally understood, and gestures tend to be culture-specific.
e. facial expressions of emotion influence the gestures of a culture.

4. The stress hormones epinephrine and norepinephrine are released from where?

a. Parasympathetic nervous system
b. Hippocampus
c. Brain stem
d. Adrenal glands
e. Hypothalamus

5. People can most readily detect the emotion of _____ in a set of facial expressions.

a. sadness
b. happiness
c. anger
d. fear
e. surprise

6. Julia is experiencing very positive emotions. A brain scan would indicate high levels of activity in her

a. right temporal lobe.
b. cerebellum.
c. left frontal lobe.
d. left temporal lobe.
e. right parietal lobe.

7. Which one of the following statements about stress is *true?*

a. Surgical wounds heal more slowly in stressed people.
b. Stress has no effect on those exposed to cold viruses.
c. There is no correlation between stress and longevity.
d. Stress makes us more resistant to infection and heart disease.
e. Anxiety, irritation, and guilt all prompt very different physiological responses.

8. The Evers' new neighbors make more money and drive nicer cars than the Evers. The Evers used to be content with what they had, but they are now jealous of the status of their new neighbors. The best explanation for this change is

a. the feel-good, do-good phenomenon.
b. the tend-and-befriend response.
c. the behavior feedback effect.
d. relative deprivation.
e. the adaptation-level phenomenon.

9. Which psychological concept would predict that smiling warmly on the outside would cause you to feel better on the inside?

a. Relative deprivation
b. Mimicry
c. Empathy
d. Facial feedback effect
e. Catharsis

0. After an alarming event, your temperature, blood pressure, and respiration are high, and you have an outpouring of hormones. Hans Selye would most likely guess that you are in which general adaptation syndrome phase?

a. Exhaustion
b. Resistance
c. Immobilization
d. Collapse
e. Shock

Free-Response Questions

1. Bill grew up in a safe neighborhood, and his family made enough money for him to be comfortably fed and clothed. Bill worked hard in school, and he has decided to apply for admission to the University of Michigan. He puts a lot of effort into his application. Five months later, Bill is elated when he receives a letter of acceptance.

Explain how each of the following psychological theories might consider Bill’s experiences.

- Maslow’s hierarchy of needs
- James-Lange theory
- Cannon-Bard theory
- Schachter-Singer two-factor theory

Rubric for Free Response Question 1

1 point: According to Maslow’s hierarchy of needs, Bill’s decision to apply to the University of Michigan is the result of a motivation to achieve the higher psychological needs of belonging, esteem, self-actualization, and self-transcendence. Bill is able to focus on these higher-level needs because his physiological and safety needs have already been met. Page 405

1 point: According to the James-Lange theory, when Bill receives the letter in the mail, his heart races and his breathing increases, which causes his brain to automatically interpret this experience as the emotion of excitement.
Note: Bill may exhibit any emotion as long as the physical arousal occurs prior to the experience of the emotion. Page 433

1 point: According to the Cannon-Bard theory, when Bill receives the letter in the mail, his heart races and his breathing increases at the same time that he experiences the emotion of excitement. He simultaneously experiences an increase in physiological arousal and the emotion of happiness. Page 433

1 point: According to the Schachter-Singer two-factor theory, when Bill opens his letter, he experiences an increase in physical arousal and determines that he is experiencing happiness based on the hopes and dreams for college that are on his mind.
Note: Bill may exhibit any emotion as long as the response includes a physical arousal *and* a cognitive labeling of that emotion. Page 434

2. Hope’s soccer team is playing in the championship game today. Hope knows the opposing team is the defending champion and that this will be a challenging game. Explain how the following theories apply to Hope’s performance and reactions during the game.

- Yerkes-Dodson law
- Affiliation needs
- Schachter-Singer two-factor theory

(3 points)

3. Franz is 17 years old and wants to lose 15 pounds. Explain how the following factors might contribute to the success or failure of his weight-loss attempt.

- Social influence
- Set point
- Sleep

- Incentive theory

(4 points)

UNIT IX Developmental Psychology

Kathleen Paulsson

MODULES

45 Developmental Issues, Prenatal Development, and the Newborn

46 Infancy and Childhood: Physical Development

47 Infancy and Childhood: Cognitive Development

48 Infancy and Childhood: Social Development

49 Gender Development

50 Parents, Peers, and Early Experiences

51 Adolescence: Physical and Cognitive Development

52 Adolescence: Social Development and Emerging Adulthood

53 Sexual Development

54 Adulthood: Physical, Cognitive, and Social Development

Life is a journey, from womb to tomb. So it is for me [DM], and so it will be for you. My story, and yours, began when a man and a woman together contributed 20,000+ genes to an egg that became a unique person. Those genes coded the protein building blocks that, with astonishing precision, formed our bodies and predisposed our traits. My grandmother bequeathed to my mother a rare hearing loss pattern, which she, in turn, gave to me (the least of her gifts). My father was an amiable extravert, and sometimes I forget to stop talking (although as a child, my talking was impeded by painful stuttering, for which Seattle Public Schools provided speech therapy).

Along with my parents’ nature, I also received their nurture. Like you, I was born into a particular family and culture, with its own way of viewing the world. My values have been shaped by a family culture filled with talking and laughter, by a religious culture that speaks of love and justice, and by an academic culture that encourages critical thinking (asking, *What do you mean? How do you know?*).

We are formed by our genes and by our contexts, so our stories will differ. But in many ways we are each like nearly everyone else on Earth. Being human, you and I have a need to belong. My mental video library, which began after age 4, is filled with scenes of social attachment. Over time, my attachments to parents loosened as peer friendships grew. After lacking confidence to date in high school, I fell in love with a college classmate and married at age 20. Natural selection predisposes us to survive and perpetuate our genes. Sure enough, two years later a child entered our lives, and I experienced a new form of love that surprised me with its intensity.

But life is marked by change. That child and his brother now live 2000 miles away, and their sister has found her calling in South Africa. The tight rubber bands linking parent and child have loosened, as yours likely have as well.

Change also marks most vocational lives, which for me transitioned from a teen working in the family insurance agency, to a premed chemistry major and hospital aide, to (after discarding my half-completed medical school applications) a psychology professor and author. I predict that in 10 years you, too, will be doing things you do not currently anticipate.

Stability also marks our development: Our life situations change, but we experience a continuous self. When I look in the mirror, I do not see the person I once was, but I feel like the person I have always been. I am the same person who, as a late teen, played basketball and discovered love. A half-century later, I still play basketball and still love (with less passion but more security) the life partner with whom I have shared life’s griefs and joys.

Continuity morphs through stages—growing up, raising children, enjoying a career, and, eventually, life’s final stage, which will demand my presence. As I wend my way through this cycle of life and death, I am mindful that life is a journey, a continuing process of development, seeded by nature and shaped by nurture, animated by love and focused by work, begun with wide-eyed curiosity and completed, for those blessed to live to a good old age, with peace and never-ending hope.

Across the life span, we grow from newborn to toddler, from toddler to teenager, and from teenager to mature adult. At each stage of life there are physical, cognitive, and social milestones. We begin with prenatal development and the newborn. Then we’ll turn our attention to infancy and childhood, adolescence, and adulthood.

Unit IX Overview Video

Module **45 Developmental Issues, Prenatal Development, and the Newborn**

LEARNING TARGETS

- 45-1 Identify three issues that have engaged developmental psychologists.
- 45-2 Discuss the course of prenatal development, and explain how teratogens affect that development.
- 45-3 Describe some abilities of the newborn, and explain how researchers are able to explore infants' mental abilities.

Developmental Psychology's Major Issues

45-1 What three issues have engaged developmental psychologists?

Researchers find human development interesting for the same reasons most of the rest of us do—they want to understand more about how we've become our current selves, and how we may change in the years ahead. **Developmental psychology** examines our physical, cognitive, and social development across the life span, with a focus on three major issues:

1. ***Nature and nurture:*** How does our genetic inheritance (our nature) interact with our experiences (our nurture) to influence our development?
2. ***Continuity and stages:*** What parts of development are gradual and continuous, like riding an escalator? What parts change abruptly in separate stages, like climbing rungs on a ladder?
3. ***Stability and change:*** Which of our traits persist through life? How do we change as we age?

developmental psychology

a branch of psychology that studies physical, cognitive, and social change throughout the life span.

AP® EXAM TIP

All three of these issues are important for development. Nature and nurture, of course, weave their way through almost every module. Look for the nature/nurture idea throughout this text (and on the AP® exam).

Nature and Nurture

The gene combination created by the merging of our mother's egg with our father's sperm helped form us as individuals. Genes predispose both our shared humanity and our individual differences.

But our experiences also form us, in the womb and in the world. Even differences rooted in our nature may be strengthened by our nurture. We are not formed by either nature or nurture, but by their interrelationships—their *interaction.* Biological, psychological, and social-cultural forces interact.

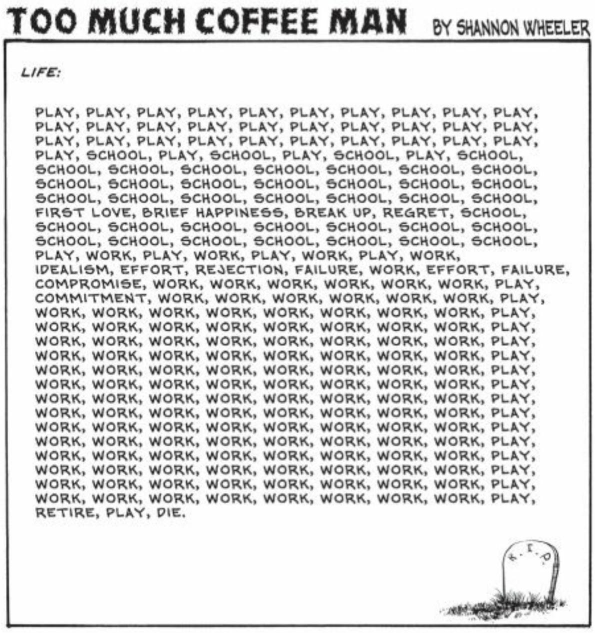
Mindful of how others differ from us, however, we often fail to notice the similarities stemming from our shared biology. Regardless of our culture, we humans share the same life cycle. We speak to our infants in similar ways and respond similarly to their coos and cries (Bornstein et al., 1992a,b). All over the world, the children of warm and supportive parents feel better about themselves and are less hostile than are the children of punishing and rejecting parents (Rohner, 1986; Scott et al., 1991). Although ethnic groups differ in school achievement and delinquency, the differences are "no more than skin deep." To the extent that family structure, peer influences, and parental education predict behavior in one of these ethnic groups, they do so for the others as well. Compared with the person-to-person differences within groups, the differences between groups are small.

> “*Nature is all that a man brings with him into the world; nurture is every influence that affects him after his birth.*”
>
> *Francis Galton,* English Men of Science, *1874*

Continuity and Stages

Do adults differ from infants as a giant redwood differs from its seedling—a difference created by gradual, cumulative growth? Or do they differ as a butterfly differs from a caterpillar—a difference of distinct stages?

Researchers who emphasize experience and learning typically see development as a slow, continuous shaping process. Those who emphasize biological maturation tend to see development as a sequence of genetically predisposed stages or steps: Although progress through the various stages may be quick or slow, everyone passes through the stages in the same order.


TOO MUCH COFFEE MAN BY SHANNON WHEELER
LIFE:
PLAY, PLAY, PLAY, PLAY, PLAY, PLAY, PLAY, PLAY, PLAY, PLAY,
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PLAY, SCHOOL, PLAY, SCHOOL, PLAY, SCHOOL, PLAY, SCHOOL,
SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL,
SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL,
SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL,
FIRST LOVE, BRIEF HAPPINESS, BREAK UP, REGRET, SCHOOL,
SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL,
SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL, SCHOOL,
PLAY, WORK, PLAY, WORK, PLAY, WORK, PLAY, WORK,
IDEALISM, EFFORT, REJECTION, FAILURE, WORK, EFFORT, FAILURE,
COMPROMISE, WORK, WORK, WORK, WORK, WORK, WORK, PLAY,
COMMITMENT, WORK, WORK, WORK, WORK, WORK, WORK, PLAY,
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WORK, WORK, WORK, WORK, WORK, WORK, WORK, WORK, PLAY,
WORK, WORK, WORK, WORK, WORK, WORK, WORK, WORK, PLAY,
RETIRE, PLAY, DIE.
R.I.P.

Shannon Wheeler

Stages of the life cycle

Are there clear-cut stages of psychological development, as there are physical stages such as walking before running? The *stage theories* we will consider—of Jean Piaget on cognitive development, Lawrence Kohlberg on moral development, and Erik Erikson on psychosocial development—propose developmental stages (summarized in **Figure 45.1**). But as we will also see, some research casts doubt on the idea that life proceeds through neatly defined age-linked stages.

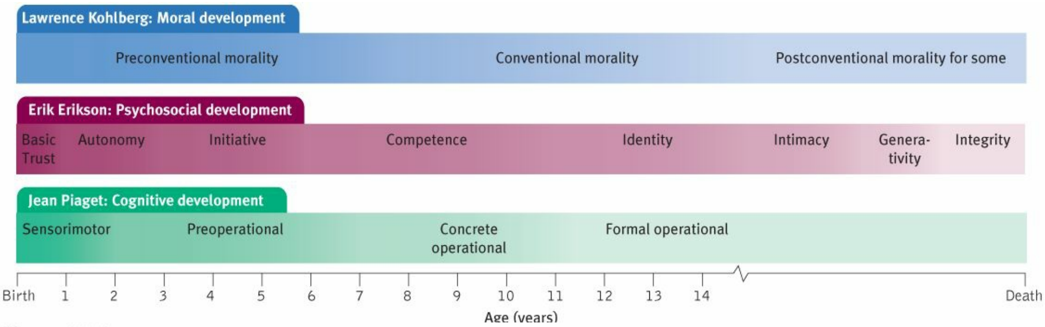

Lawrence Kohlberg: Moral development
Preconventional morality
Conventional morality
Postconventional morality for some
Erik Erikson: Psychosocial development
Basic Trust
Autonomy
Initiative
Competence
Identity
Intimacy
Genera-tivity
Integrity
Jean Piaget: Cognitive development
Sensorimotor
Preoperational
Concrete operational
Formal operational
Birth
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Death
Age (years)

Figure 45.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 45.1 **Comparing the stage theories**

(With thanks to Dr. Sandra Gibbs, Muskegon Community College, for inspiring this illustration.)

Although many modern developmental psychologists do not identify as stage theorists, the stage concept remains useful. The human brain does experience growth spurts during childhood and puberty that correspond roughly to Piaget’s stages (Thatcher et al., 1987). And stage theories contribute a developmental perspective on the whole life span, by suggesting how people of one age think and act differently when they arrive at a later age.

Stability and Change

As we follow lives through time, do we find more evidence for stability or change? If reunited with a long-lost grade-school friend, do we instantly realize that “it’s the same old Andy”? Or do people we once befriended seem like strangers? (At least one acquaintance of mine [DM’s] would choose the second option. At his 40-year college reunion, he failed to recognize a former classmate. The understandably appalled classmate was his long-ago first wife!)

FYI

Another stage theory, Sigmund Freud’s ideas about how personality develops, is discussed in Unit X.

We experience both stability and change. Some of our characteristics, such as *temperament*, are very stable:

- One research team that studied 1000 people from ages 3 to 38 was struck by the consistency of temperament and emotionality across time (Moffitt et al., 2013; Slutske et al., 2012). Out-of-control 3-year-olds were the most likely to become teen smokers, adult criminals, or out-of-control gamblers. In another study, 6-year-old Canadian boys with conduct problems were four times more likely than other boys to be convicted of a violent crime by age 24 (Hodgins et al., 2013).

- Another research team showed that extraversion among British 16-year-olds predicted their future happiness as 60-year-olds (Gale et al., 2013). And the widest smilers in childhood and college photos are, years later, the ones most likely to enjoy enduring marriages (Hertenstein et al., 2009).
- A 40-year study found that responsible primary school children even outlive their out-of-control classmates (Spengler et al., 2016).

> “*When I look at myself in the first grade and I look at myself now, I’m basically the same. The temperament is not that different.*”
>
> *Donald J. Trump to his biographer, in* Never Enough, *2015*

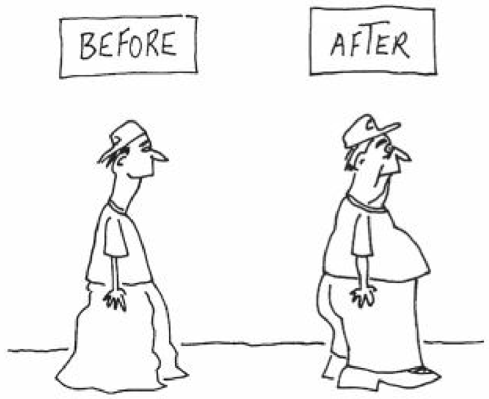
“As at 7, so at 70,” says a Jewish proverb. People predict that they will not change much in the future (Quoidbach et al., 2013). In some ways, they are right. As people grow older, personality gradually stabilizes (Briley & Tucker-Drob, 2014; Specht et al., 2014).

Left Image: Tom Prokop/Shutterstock; Right Image: Photodisc /Getty Images

Smiles predict marital stability In one longitudinal study of 306 college alums, 1 in 4 with yearbook expressions like the one on the left later divorced, as did only 1 in 20 with smiles like the one on the right (Hertenstein et al., 2009).

We cannot, however, predict all aspects of our future selves based on our early life. Our social attitudes, for example, are much less stable than our temperament, especially during the impressionable late adolescent years (Krosnick & Alwin, 1989; Rekker et al., 2015). Older children and adolescents learn new ways of coping. Although delinquent children have elevated rates of later problems, many confused and troubled children blossom into mature, successful adults (Moffitt et al., 2002; Roberts, et al., 2013; Thomas & Chess, 1986). Life is a process of becoming. Our present struggles may lay the foundation for a happier tomorrow.

In some ways, we *all* change with age. Most shy, fearful toddlers begin opening up by age 4, and most people become more conscientious, stable, agreeable, and self-confident in the years after adolescence (Lucas & Donnellan, 2009; Shaw et al., 2010; Van den Akker et al., 2014). Risk-prone adolescents tend to become more cautious adults (Mata et al., 2016). Indeed, many irresponsible 16-year-olds have matured into 40-year-old business or cultural leaders. (If you are the former, you aren't done yet.) Such changes can occur without changing a person's position *relative to others* of the same age. The hard-driving young adult may mellow by later life, yet still be a relatively driven senior citizen.



The New Yorker Collection, 1998, Peter Mueller from cartoonbank.com. All Rights Reserved.

As adults grow older, there is continuity of self.

Life requires *both* stability and change. Stability provides our identity, enabling us to depend on others and on ourselves. Our potential for change gives us our hope for a brighter future, allowing us to adapt and grow with experience.

✓ Check Your Understanding

Ask Yourself

- Are you the same person you were as a preschooler? As an 8-year-old? As a 12-year-old? How are you different? How are you the same?

Test Yourself

- Developmental researchers who emphasize learning and experience are supporting _______________; those who emphasize biological maturation are supporting _______________.
- What findings in psychology support (1) the stage theory of development and (2) the idea of stability in personality across the life span?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Prenatal Development and the Newborn

45-2 What is the course of prenatal development, and how do teratogens affect that development?

AP® EXAM TIP

Almost every topic in psychology holds personal relevance, but development stands out. As you work your way through this unit, think of how the material relates to you, your relatives, and your friends. The more often you do this, the easier it will be to remember the material.

Conception

Nothing is more natural than a species reproducing itself. And nothing is more wondrous. For you, the process started inside your *grandmother*—as an egg formed inside a developing female inside of her. (Your mother was born with all the immature eggs she would ever have.) Your father, in contrast, began producing sperm cells nonstop at puberty—in the beginning at a rate of more than 1000 sperm during the second it takes to read this phrase.

Some time after puberty, your mother's ovary released a mature egg—a cell roughly the size of the period that ends this sentence. Like space voyagers approaching a huge planet, some 250 million deposited sperm began their frantic race upstream, approaching a cell 85,000 times their own size. The small number reaching the egg released digestive enzymes that ate away the egg's protective coating (**Figure 45.2a**). The one winning sperm penetrated the coating and was welcomed in (Figure 45.2b), the egg's surface blocking out the others. Before half a day elapsed, the egg nucleus and the sperm nucleus fused: The two became one.

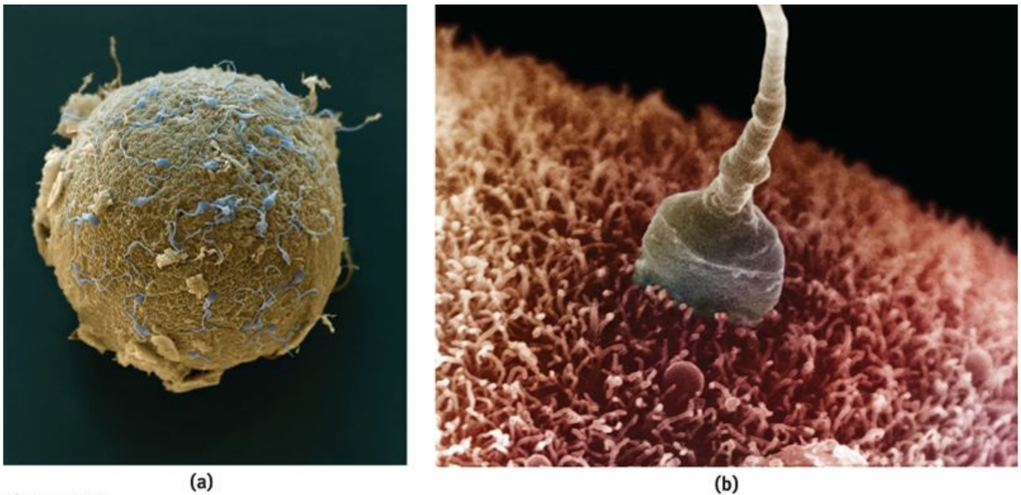


Figure 45.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
(a) Eye of Science/Science Source; (b) David M. Phillips/Science Source

Figure 45.2 Life is sexually transmitted

(a) Sperm cells surround an egg. (b) As one sperm penetrates the egg's jellylike outer coating, a series of chemical events begins that will cause sperm and egg to fuse into a single cell. If all goes well, that cell will subdivide again and again to emerge 9 months later as a 37-trillion-cell human being.

Consider it your most fortunate of moments. Among 250 million sperm, the one needed to make you, in combination with that one particular egg, won the race. And so it was for innumerable generations before us. If any one of our ancestors had been conceived with a different sperm or egg, or died before conceiving, or not chanced to meet their partner or . . . . The mind boggles at the improbable, unbroken chain of events that produced us.

Prenatal Development

Flip It Video: Teratogens

How many fertilized eggs, called **zygotes**, survive beyond the first 2 weeks? Fewer than half (Grobstein, 1979; Hall, 2004). But for us, good fortune prevailed. One cell became 2, then 4—each just like the first—until this cell division had produced some 100 identical cells within the first week. Then the cells began to differentiate—to specialize in structure and function ("I'll become a brain, you become intestines!").

zygote

the fertilized egg; it enters a 2-week period of rapid cell division and develops into an embryo.

TRY THIS

Care to guess your body’s total number of cells?[1]

About 10 days after conception, the *germinal stage* completes as the zygote attaches to the mother’s uterine wall, beginning approximately 37 weeks of the closest human relationship. The zygote’s inner cells become the **embryo** (Figure 45.3a). Many of its outer cells become the *placenta*, the life-link that transfers nutrients and oxygen from mother to embryo. A healthy and well-nourished mother helps form a healthy baby-to-be. Over the next 6 weeks, the embryo’s organs begin to form and function. The heart begins to beat.

embryo

the developing human organism from about 2 weeks after fertilization through the second month.

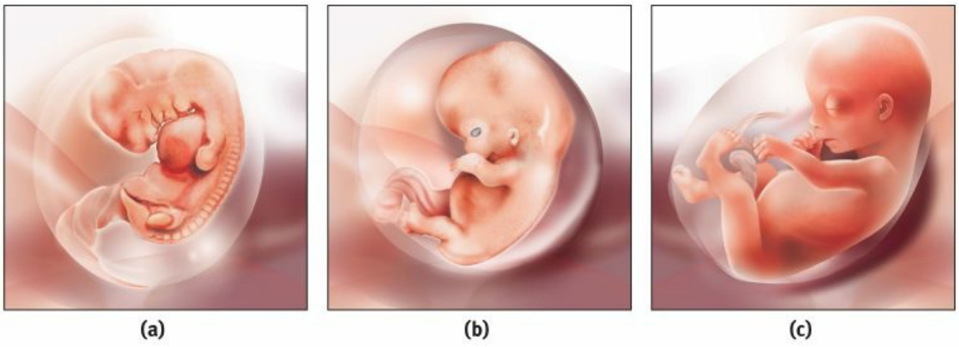


Figure 45.3
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Figure 45.3 Prenatal development

(a) The embryo grows and develops rapidly. At 40 days, the spine is visible and the arms and legs are beginning to grow. (b) By the start of the ninth week, when the fetal period begins, facial features, hands, and feet have formed. (c) As the fetus enters the 16th week, its 3 ounces could fit in the palm of your hand.

By 9 weeks after conception, an embryo looks unmistakably human (Figure 45.3b). It is now a **fetus** (Latin for "offspring" or "young one"). During the sixth month, organs such as the stomach develop enough to give the fetus a good chance of surviving and thriving if born prematurely.

fetus

the developing human organism from 9 weeks after conception to birth.

At each prenatal stage, genetic and environmental factors affect our development. By the sixth month, the fetus is responsive to sound. Microphone readings taken inside the uterus reveal that the fetus is exposed to the sound of its mother's muffled voice (Ecklund-Flores, 1992; Hepper, 2005). Immediately after emerging from their underwater world, newborns prefer their mother's voice to another woman's, or to their father's (DeCasper et al., 1986, 1994; Lee & Kisilevsky, 2014).

They also prefer hearing their mother's language. In one study, day-old American and Swedish newborns paused more in their pacifier sucking when listening to familiar vowels from their mother's language (Moon et al., 2013). After repeatedly hearing a fake word *(tatata)* in the womb, Finnish newborns' brain waves displayed recognition when hearing the word after birth (Partanen et al., 2013). If their mother spoke two languages during pregnancy, newborns display interest in both (Byers-Heinlein et al., 2010). And just after birth, the melodic ups and downs of newborns' cries bear the tuneful signature of their mother's native tongue (Mampe et al., 2009). Babies born to French-speaking mothers tend to cry with the rising intonation of French; babies born to German-speaking mothers cry with the falling tones of German. Would you have guessed? The learning of language begins in the womb.

In the two months before birth, fetuses demonstrate learning in other ways, as when they adapt to a vibrating, honking device placed on their mother’s abdomen (Dirix et al., 2009). Like people who adapt to the sound of trains in their neighborhood, fetuses get used to the honking. Moreover, four weeks later, they recall the sound (as evidenced by their mild response, compared with the reactions of those fetuses not previously exposed).

Sounds are not the only environmental factors that impact fetal development. In addition to transferring nutrients and oxygen from mother to fetus, the placenta screens out many harmful substances. But some slip by. **Teratogens,** agents such as viruses and drugs, can damage an embryo or fetus. This is one reason pregnant women are advised not to smoke cigarettes or marijuana or to drink alcohol. A pregnant woman never smokes or drinks alone. When alcohol enters her bloodstream, and that of her fetus, it reduces activity in both their central nervous systems. Alcohol use during pregnancy may prime the woman’s offspring to like alcohol and put them at risk for heavy drinking and alcohol use disorder during their teen years. In experiments, when pregnant rats drank alcohol, their young offspring later displayed a liking for alcohol’s taste and odor (Youngentob et al., 2007, 2009).

teratogens

(literally, “monster makers”) agents, such as chemicals and viruses, that can reach the embryo or fetus during prenatal development and cause harm.

moodboard/Getty Images

> “You shall conceive and bear a son. So then drink no wine or strong drink.”
>
> Judges 13:7

Even light drinking or occasional binge drinking can affect the fetal brain (Braun, 1996; Marjonen et al., 2015). Persistent heavy drinking puts the fetus at risk for a dangerously low birth weight, birth defects, future behavior problems, and lower intelligence. For 1 in about 700 children, the effects are visible as **fetal alcohol syndrome (FAS),** the most serious of all fetal alcohol spectrum disorders, marked by lifelong physical and mental abnormalities (May et al., 2014). The fetal damage may occur because alcohol has an *epigenetic effect:* It leaves chemical marks on DNA that switch genes abnormally on or off (Liu et al., 2009). Smoking during pregnancy also leaves epigenetic scars that weaken infants’ ability to handle stress (Stroud et al., 2014).

fetal alcohol syndrome (FAS)

physical and cognitive abnormalities in children caused by a pregnant woman's heavy drinking. In severe cases, signs include a small, out-of-proportion head and abnormal facial features.

If a pregnant woman experiences extreme stress, the stress hormones flooding her body may indicate a survival threat to the fetus and produce an earlier delivery (Glynn & Sandman, 2011). Some stress early in life prepares us to cope with later adversity. But substantial prenatal stress exposure puts a child at increased risk for health problems such as hypertension, heart disease, obesity, and psychiatric disorders.

The Competent Newborn

45-3 What are some newborn abilities, and how do researchers explore infants' mental abilities?

Babies come with apps preloaded. Having survived prenatal hazards, we as newborns *(neonates)* came equipped with automatic reflex responses ideally suited for our survival. We withdrew our limbs to escape pain. If a cloth over our face interfered with our breathing, we turned our head from side to side and swiped at it.

New parents are often in awe of the coordinated sequence of reflexes by which their baby gets food. When something touches their cheek, babies turn toward that touch, open their mouth, and vigorously *root* for a nipple. Finding one, they automatically close on it and begin *sucking.* (Failing to find satisfaction, the hungry baby may cry—a behavior parents find highly unpleasant, and very rewarding to relieve.) Other adaptive reflexes include the *startle reflex* (when arms and legs spring out, quickly followed by fist clenching and loud crying) and the surprisingly strong *grasping reflex*, both of which may have helped infants stay close to their caregivers.

The pioneering American psychologist William James presumed that the newborn experiences a "blooming, buzzing confusion," an assumption few people challenged until the 1960s. But then scientists discovered that babies can tell you a lot—if you know how to ask. To ask, you must capitalize on what babies can do—gaze, suck, and turn their heads. So, equipped with eye-tracking machines and pacifiers wired to electronic gear, researchers set out to answer parents' age-old questions: What can my baby see, hear, smell, and think?

Consider how researchers exploit **habituation**—a decrease in responding with repeated stimulation. We saw this earlier when fetuses adapted to a vibrating, honking device placed on their mother's abdomen. The novel stimulus gets attention when first presented. With repetition, the response weakens. This seeming boredom with familiar stimuli gives us a way to ask infants what they see and remember.

habituation

decreasing responsiveness with repeated stimulation. As infants gain familiarity with repeated exposure to a stimulus, their interest wanes and they look away sooner.

Even as newborns, we prefer sights and sounds that facilitate social responsiveness. We turn our heads in the direction of human voices. We gaze longer at a drawing of a face-like image (**Figure 45.4**). We prefer to look at objects 8 to 12 inches away. Wonder of wonders, that just happens to be about the distance between a nursing infant's eyes and its mother's (Maurer & Maurer, 1988). Our brain's default settings help us connect socially.

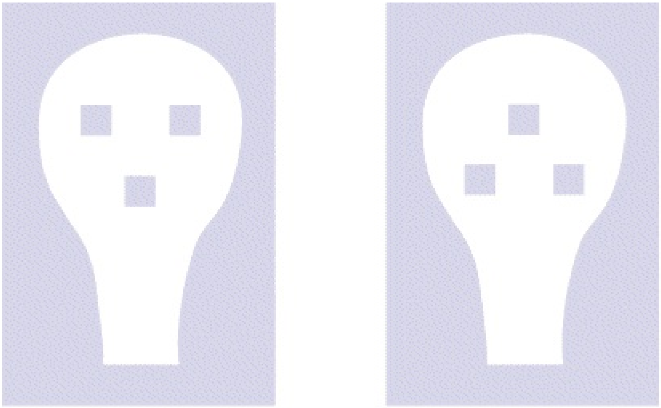

Figure 45.4
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e,
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Figure 45.4 Newborns' preference for faces

When shown these two stimuli with the same three elements, Italian newborns spent nearly twice as many seconds looking at the face-like image (Johnson & Morton, 1991). Canadian newborns—average age 53 minutes in one study—displayed the same apparently inborn preference to look toward faces (Mondloch et al., 1999).

Within days after birth, our brain's neural networks were stamped with the smell of our mother's body. Week-old nursing babies, placed between a gauze pad from their mother's bra and one from another nursing mother, have usually turned toward the smell of their own mother's pad (MacFarlane, 1978). What's more, that smell preference lasts. One experiment capitalized on the fact that some nursing mothers in a French maternity ward used a chamomile-scented balm to prevent nipple soreness (Delaunay-El Allam et al., 2010). Twenty-one months later, their toddlers preferred playing with chamomile-scented toys! Their peers who had not sniffed the scent while breast-feeding showed no such preference. (This makes us wonder: Will these children, who learned to associate chamomile with their mother's breast, grow up to become devoted chamomile tea drinkers?) Such studies reveal the remarkable abilities with which we enter our world.

Left: Lightscapes Photography, Inc./Corbis/Glow Images; Right: Alice DeWall

Prepared to feed and eat Animals are predisposed to respond to their offspring’s cries for nourishment, even if they are in the middle of an ultramarathon, as I [ND] was when my 18-month-old Bevy decided that only Daddy could feed her.

Check Your Understanding

Ask Yourself

- Are you surprised by the news of infants’ competencies? Remember hindsight bias from Module 4? Is this one of those cases where it feels like you “knew it all along”?

Test Yourself

- The first two weeks of prenatal development is the period of the _______________. The period of the _______________ lasts from 9 weeks after conception until birth. The time between those two prenatal periods is considered the period of the _______________.
- Your friend’s older sister—a regular drinker—hopes to become pregnant soon and has stopped drinking. Why is this a good idea? What negative effects might alcohol consumed during pregnancy have on a developing fetus?
- Infants’ _______________ to repeated stimulation helps developmental psychologists study what they can learn and remember.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 45 REVIEW

45-1 What three issues have engaged developmental psychologists?

- *Developmental psychologists* study physical, mental, and social changes throughout the life span.
- They focus on three issues: nature and nurture (the interaction between our genetic inheritance and our experiences); continuity and stages (which aspects of development are gradual and continuous, and which change relatively abruptly); and stability and change (whether our traits endure or change as we age).

45-2 What is the course of prenatal development, and how do teratogens affect that development?

- The life cycle begins at conception, when one sperm cell unites with an egg to form a *zygote*.
- The zygote's inner cells become the *embryo*, and in the next 6 weeks, body organs begin to form and function.
- By 9 weeks, the *fetus* is recognizably human.
- *Teratogens* are potentially harmful agents, such as viruses or drugs, that can pass through the placental screen and harm the developing embryo or fetus, as happens with *fetal alcohol syndrome*.

45-3 What are some newborn abilities, and how do researchers explore infants' mental abilities?

- Babies are born with sensory equipment and reflexes that facilitate their survival and their social interactions with adults. For example, they quickly learn to discriminate their mother's smell, and they prefer the sound of human voices.

- Researchers use techniques that test *habituation*, such as the visual-preference procedure, to explore infants' abilities.

Multiple-Choice Questions

1. Juliette is experiencing lifelong physical and mental abnormalities because her mother consumed alcohol while she was pregnant. The alcohol, because of the damage it caused, is considered a(n)

a. reflex.
b. embryo.
c. teratogen.
d. epigenetic.
e. zygote.

2. Even as newborns, we prefer sights and sounds that facilitate social responsiveness. This can be seen by a newborn's preference for

a. soft music.
b. face-like images.
c. low pitched sounds.
d. soft colors.
e. loud music.

3. As infants gain familiarity with repeated exposure to a visual stimulus, their interest wanes and they look away sooner. The decrease in an infant's responsiveness is called

a. concentration.
b. teratogens.
c. habituation.
d. stability.
e. a stage.

4. Which developmental issue best represents how our genes and environment interact?

a. Habituation and maturation
b. Stability and change

c. Continuity and stability
d. Continuity and stages
e. Nature and nurture

5. What is the prenatal development sequence?

a. Zygote, fetus, embryo
b. Fetus, zygote, embryo
c. Embryo, zygote, fetus
d. Zygote, embryo, fetus
e. Fetus, embryo, zygote

6. Some people think development occurs in the same way a tree grows—slowly and steadily. Others think that there are rather abrupt developmental jumps—more like the transformation of a tadpole into a frog. Which of the following issues would this difference of opinion relate to?

a. Nature and nurture
b. Maturation and learning
c. Prenatal and neonatal
d. Stability and change
e. Continuity and stages

Practice FRQs

1. Dr. Cordova is planning a study of infants in her community. Describe how the following may have an impact on her study:

- Teratogens
- Habituation

Answer

1 point: If the infants she is studying were exposed to teratogens in the womb, then their abilities outside the womb may reflect that. For example, an infant whose mother consumed alcohol might have fetal alcohol syndrome (FAS) and a range of associated problems, such as lower intelligence, that may affect the study. [Page 490]

1 point: To learn more about infant cognition, Dr. Cordova may watch for habituation to occur—when the infants respond less frequently to a stimulus because they recognize and remember it. [Page 491]

2. Three major issues are addressed by psychologists in the study of human development. Identify and state how all three might explain how children’s traits and abilities develop.

(3 points)

Module **46 Infancy and Childhood: Physical Development**

LEARNING TARGETS

- **46-1 Describe key developmental changes in the brain and in motor skills during infancy and childhood.**
- **46-2 Discuss how an infant’s brain begins processing memories.**

46-1 During infancy and childhood, how do the brain and motor skills develop?

As a flower unfolds in accord with its genetic instructions, so do we. **Maturation**—the orderly sequence of biological growth—decrees many of our commonalities. We stand before walking. We use nouns before adjectives. Severe deprivation or abuse can slow development, but genetic growth patterns are inborn. Biological maturation (nature) sets the basic course of development; experience (nurture) adjusts it. Genes and scenes interact.

maturation

biological growth processes that enable orderly changes in behavior, relatively uninfluenced by experience.

Brain Development

In your mother’s womb, your developing brain formed nerve cells at the explosive rate of nearly one-quarter million per minute. The developing brain cortex actually overproduces neurons, with the number peaking at 28 weeks (Rabinowicz et al., 1996, 1999).

From infancy on, brain and mind—neural hardware and cognitive software—develop together. On the day you were born, you had most of the brain cells you would ever have. However, your nervous system was immature: After birth, the brain’s branching neural networks that eventually enabled you to walk, talk, and remember had a wild growth spurt (**Figure 46.1**). This rapid development helps explain why infant brain size increases rapidly in the early days after birth (Holland et al., 2014). From ages 3 to 6, the most rapid growth was in your frontal lobes, which enable rational planning. During those years, your brain required vast amounts of energy (Kuzawa et al., 2014). This energy-intensive process caused rapid progress in your ability to control your attention and behavior (Garon et al., 2008; Thompson-Schill et al., 2009).

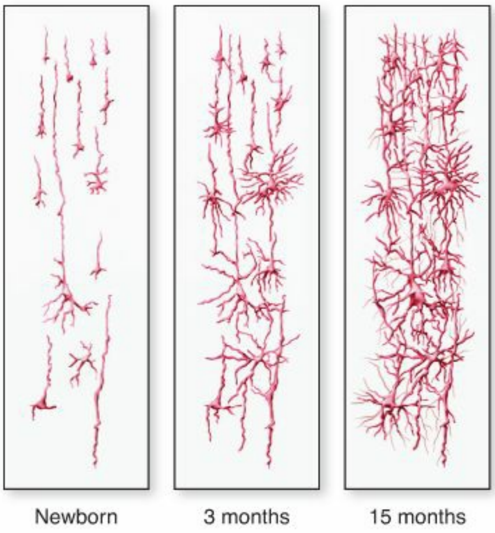


Figure 46.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 46.1 Infant brain development

In humans, the brain is immature at birth. As the child matures, the neural networks grow increasingly complex.

> “*It is a rare privilege to watch the birth, growth, and first feeble struggles of a living human mind.*”
>
> *Annie Sullivan, in Helen Keller’s* The Story of My Life, *1903*

The brain’s association areas—those linked with thinking, memory, and language—were the last cortical areas to develop. As they did, your mental abilities surged (Chugani & Phelps, 1986; Thatcher et al., 1987). Fiber pathways supporting agility, language, and self-control proliferated into puberty. Under the influence of adrenal hormones, tens of billions of synapses formed and organized, while a use-it-or-lose-it *pruning* process shut down unused links (Paus et al., 1999; Thompson et al., 2000).

AP® EXAM TIP

Note that maturation, to developmental psychologists, is a biological sequence. This is much more precise than the general notion that maturation means to become more adult-like.

Motor Development

The developing brain enables physical coordination. Skills emerge as infants exercise their maturing muscles and nervous system. With occasional exceptions, the motor development sequence is universal. Babies roll over before they sit unsupported, and they usually crawl before they walk. These behaviors reflect not imitation but a maturing nervous system; blind children, too, crawl before they walk (Figure 46.2).

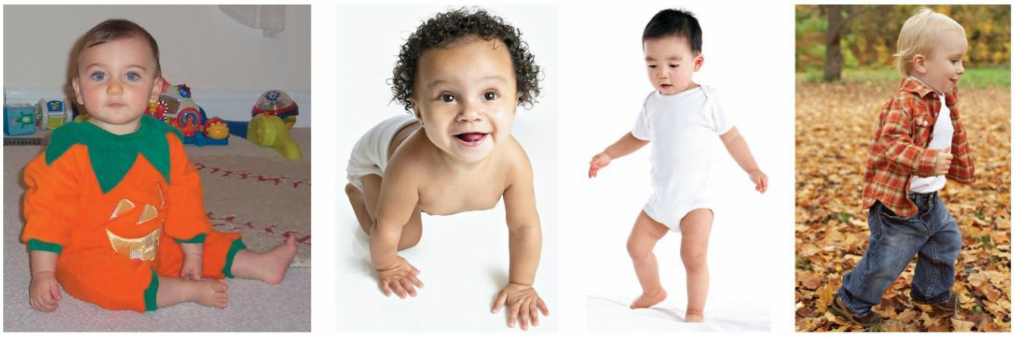


Figure 46.2
From Left to Right: Renee Altier for Worth Publishers; John Lund/Annabelle Breakey/Blend Images/Getty Images; Blue Jean Images/Alamy; Radius
Images/Alamy

Figure 46.2 Triumphant toddlers

Sit, crawl, walk, run—the sequence of these motor development milestones is the same the world around, though babies reach them at varying ages.

Flip It Video: Major Developmental Milestones

PA Archive/The Image Works

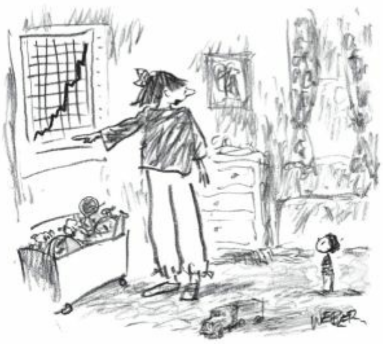
Baby brains This “electrode cap” allows researchers to detect changes in brain activity triggered by different stimuli.

Genes guide motor development. In the United States, 25 percent of all babies walk by 11 months of age, 50 percent within a week after their first birthday, and 90 percent by age 15 months (Frankenburg et al., 1992). Identical twins typically begin walking on nearly the same day (Wilson, 1979). Maturation—including the rapid development of the cerebellum at the back of the brain—creates our readiness to learn walking at about age 1. The same is true for other physical skills, including bowel and bladder control. Before necessary muscular and neural maturation, neither pleading nor punishment will produce successful toilet training. You can’t rush a child’s first flush.

FYI

In the eight years following the 1994 launch of a U.S. Back to Sleep educational campaign, the number of infants sleeping on their stomach dropped from 70 to 11 percent—and SIDS (sudden infant death syndrome) deaths fell by half (Braiker, 2005).

Still, nurture may amend what nature intends. In some regions of Africa, the Caribbean, and India, caregivers often massage and exercise babies, which can accelerate the process of learning to walk (Karasik et al., 2010). The recommended infant *back to sleep position* (putting babies to sleep on their backs to reduce crib-death risk) has been associated with somewhat later crawling but not with later walking (Davis et al., 1998; Lipsitt, 2003).



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“This is the path to adulthood. You’re here.”

Brain Maturation and Infant Memory

46-2 How does an infant's developing brain begin processing memories?

Can you recall your third birthday party? Studies suggest that we *consciously* recall little from before age 4. Mice and monkeys also forget their early life, as rapid neuron growth disrupts the circuits that stored old memories (Akers et al., 2014). But as children mature, this *infantile amnesia* wanes, and they become increasingly capable of remembering experiences, even for a year or more (Bauer & Larkina, 2014; Morris et al., 2010). The brain areas underlying memory, such as the hippocampus and frontal lobes, continue to mature during and after adolescence (Luby et al., 2016; Murty et al., 2016).

Despite *consciously* recalling little from our early years, our brain was processing and storing information. While finishing her doctoral work in psychology, Carolyn Rovee-Collier observed nonverbal infant memory in action. Her colicky 2-month-old, Benjamin, could be calmed by moving a crib mobile. Weary of hitting the mobile, she strung a cloth ribbon connecting the mobile to Benjamin's foot. Soon, he was kicking his foot to move the mobile. Thinking about her unintended home experiment, Rovee-Collier realized that, contrary to popular opinion in the 1960s, babies can learn. To know for sure that her son wasn't just a whiz kid, she repeated the experiment with other infants (Rovee-Collier, 1989, 1999). Sure enough, they, too, soon kicked more when hitched to a mobile, both on the day of the experiment and the day after. If, however, she hitched them to a different mobile the next day, the infants showed no learning, indicating that they remembered the original mobile and recognized the difference. Moreover, when tethered to the familiar mobile a month later, they remembered the association and again began kicking (**Figure 46.3**).

Figure 46.3
Aurelie and Morgan David de Lossy/Getty Images

Figure 46.3 Infant at work

Babies only 3 months old learned that kicking moves a mobile, and they retained that learning for a month (Rovee-Collier, 1989, 1997).

Traces of forgotten childhood languages may also persist. One study tested English-speaking British adults who had no conscious memory of the Hindi or Zulu they had spoken as children. Yet, up to age 40, they could relearn subtle sound contrasts in these languages that other English speakers could *not* learn (Bowers et al., 2009). Chinese adoptees living in Canada since age 1 process Chinese sounds as do native speakers, even if they have no conscious recollection of Chinese words (Pierce et al., 2014). Again, our two-track mind is at work: What the conscious mind does not know and cannot express in words, the nervous system and unconscious mind somehow remember.

✓ Check Your Understanding

Ask Yourself

- What do you tend to regard as your earliest memory? Now that you know about infantile amnesia, has your opinion changed about the accuracy of that memory?

Test Yourself

- What is the biological growth process that explains why most children begin walking by about 12 to 15 months?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 46 REVIEW

46-1 During infancy and childhood, how do the brain and motor skills develop?

- The brain's nerve cells are sculpted by heredity and experience. Their interconnections multiply rapidly after birth, a process that continues until puberty, when a pruning process begins shutting down unused connections.
- Complex motor skills—sitting, standing, walking—develop in a predictable sequence, though the timing of that sequence is a function of individual *maturation* and culture.

46-2 How does an infant's developing brain begin processing memories?

- We have few or no conscious memories of events occurring before about age 4, in part because major brain areas have not yet matured.
- Despite the lack of conscious recall, our brains were still processing and storing information. This is evident in those who spoke different languages as young children and are able to relearn their sounds more easily as adults.

Multiple-Choice Questions

1. As the infant's brain develops, some neural pathways will decay if not used. This use-it-or-lose-it process is known as

a. motor development.
b. pruning.
c. heredity.
d. amnesia.
e. maturation.

2. Maturation explains why

a. we stand before we walk.
b. we like familiar people.
c. we learn the language accents of our peers.
d. infants become attracted to scents associated with their mother’s nursing.
e. the brain shuts down unused connections.

3. Which of the following is true of the early formation of brain cells?

a. They form at a constant rate throughout the prenatal period.
b. They begin forming slowly, and then the rate increases throughout prenatal development.
c. They form slowly during the prenatal period, and then the rate increases after birth.
d. They form at a constantly increasing rate prenatally and in early childhood.
e. They are overproduced early in the prenatal period, and then the rate decreases and stabilizes.

4. Infantile amnesia best explains why

a. Justina, age 25, cannot remember hearing Japanese when she was 10.
b. Ella, age 10, has no memories of her third birthday party.
c. Karla, age 3, can’t understand why her new brother is crying.
d. Becka, age 2, is unable to remember where she left her doll.
e. Hannah, age 6, can’t remember the gymnastics routine she just learned.

Practice FRQs

1. Define and give an example of maturation. Define infantile amnesia and explain how maturation contributes to this phenomenon.

Answer

1 point: Maturation describes the orderly changes in behavior that result from biological processes that are relatively unaffected by experience. Page 494

1 point: Various examples will be accepted here, including the normal development of motor skills (for example, rolling over, crawling) or bladder and bowel control. Page 494–495

1 point: Infantile amnesia is our inability to remember events that occurred before we were about 4 years old. Page 495

1 point: The brain areas underlying memory need to mature before we can remember accurately. This maturation usually doesn’t happen until around the age of 4. Page 495

2. Three types of development are listed below. Give a specific example of each.

- Brain development
- Motor development
- Infant memory

(3 points)

Module **47 Infancy and Childhood: Cognitive Development**

LEARNING TARGETS

- 47-1 Describe how a child's mind develops from the perspectives of Piaget, Vygotsky, and today's researchers.
- 47-2 Discuss *autism spectrum disorder* and its effect on development.

Flip It Video: Schemas, Assimilation, and Accommodation

47-1 From the perspectives of Piaget, Vygotsky, and today's researchers, how does a child's mind develop?

Somewhere on your precarious journey "from egghood to personhood" (Broks, 2007), you became conscious. When was that? In search of the conscious thoughts of an infant—or, rather, a neural signal that marks early conscious awareness—one French research team flashed faces on a screen. At first, the faces appeared so briefly that even a typical adult could not consciously perceive them. Gradually, the presentation slowed until an adult brain-wave response signaled conscious awareness, about 300 milliseconds after an image appeared. With enough time to process the faces, 5-month-old infants displayed the same brain signature of visual awareness (Dehaene, 2014; Kouider et al., 2013).

Once conscious, how did your mind grow? Developmental psychologist Jean Piaget [pee-ah-ZHAY] spent his life searching for the answer. He studied children’s **cognition**—all the mental activities associated with thinking, knowing, remembering, and communicating. His interest in children’s cognitive development began in 1920, when he was in Paris developing questions for children’s intelligence tests. While administering the tests, Piaget became intrigued by children’s wrong answers, which were often strikingly similar among same-age children. Where others saw childish mistakes, Piaget saw intelligence at work. Such accidental discoveries are among the fruits of psychological science.

Bill Anderson/Science Source

Jean Piaget (1896–1980) “If we examine the intellectual development of the individual or of the whole of humanity, we shall find that the human spirit goes through a certain number of stages, each different from the other” (1930).

cognition

all the mental activities associated with thinking, knowing, remembering, and communicating.

A half-century spent with children convinced Piaget that a child’s mind is not a miniature model of an adult’s. Thanks partly to his careful observations, we now understand that children reason differently than adults, in “wildly illogical ways” (Brainerd, 1996).

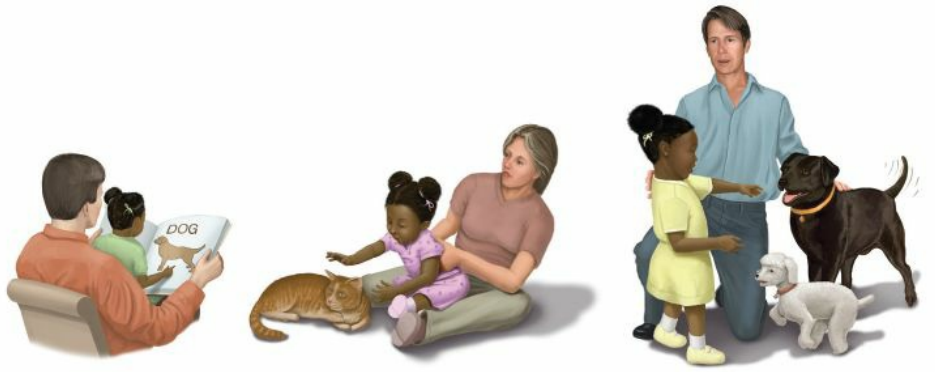
Piaget’s studies led him to believe that a child’s mind develops through a series of stages, in an upward march from the newborn’s simple reflexes to the adult’s abstract reasoning power. Thus, an 8-year-old can comprehend things a toddler cannot, such as the analogy that "getting an idea is like having a light turn on in your head."

Piaget's core idea was that our intellectual progression reflects an unceasing struggle to make sense of our experiences. To this end, the maturing brain builds **schemas**, concepts or mental molds into which we pour our experiences.

schema

a concept or framework that organizes and interprets information.

To explain how we use and adjust our schemas, Piaget proposed two more concepts. First, we **assimilate** new experiences—we interpret them in terms of our current understandings (schemas). Having a simple schema for *dog*, for example, a toddler may call all four-legged animals *dogs* (**Figure 47.1**). But as we interact with the world, we also adjust, or **accommodate**, our schemas to incorporate information provided by new experiences. Thus, the child soon learns that the original *dog* schema is too broad and accommodates by refining the category. By adulthood we have built countless schemas, ranging from *cats* and *dogs* to our concept of *love* (**Figure 47.2**).



(a) Two-year-old Alexandra has learned the schema for *doggy* from her picture books.

(b) Alexandra sees a cat and calls it a *doggy*. She is trying to assimilate this new animal into an existing schema. Her mother tells her, "No, it's a *cat*."

(c) Alexandra accommodates her schema for furry four-legged animals, distinguishing dogs from cats. Over time her schemas become more sophisticated as she learns to distinguish the pets of family and friends by name.

Figure 47.1

Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 47.1 Pouring experience into mental molds

We use our existing schemas to *assimilate* new experiences. But sometimes we need to *accommodate* (adjust) our schemas to include new experiences.

assimilation

interpreting our new experiences in terms of our existing schemas.

accommodation

adapting our current understandings (schemas) to incorporate new information.

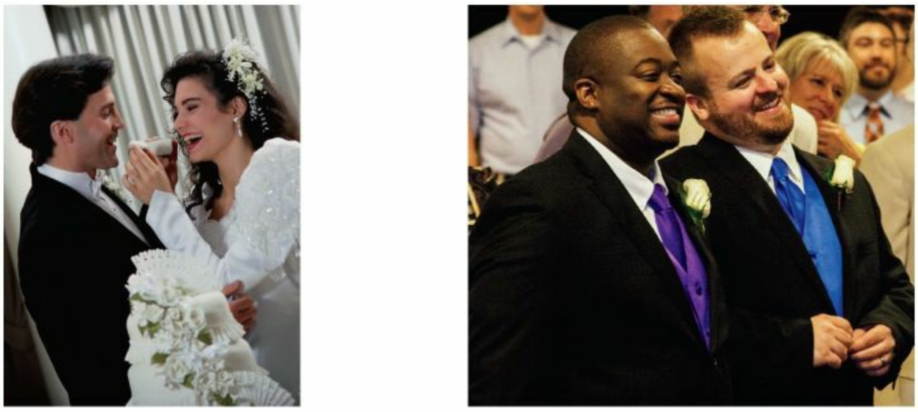


Figure 47.2

Left: Image Ideas/Getty Images; Right: Christian L Birmele

Figure 47.2 A changing marriage schema

A generation ago, most people had a schema of marriage as a union between a man and a woman. The Netherlands was the first country to change its marriage laws to accommodate same-sex marriage (in 2001). Today, more than 20 other countries have also legalized same-sex marriage.

Piaget’s Theory and Current Thinking

Piaget believed that children construct their understanding of the world while interacting with it. Their minds experience spurts of change, followed by greater stability as they move from one cognitive plateau to the next, each with distinctive characteristics that permit specific kinds of thinking. In Piaget’s view, cognitive development consisted of four major stages—*sensorimotor, preoperational, concrete operational,* and *formal operational.*

AP® EXAM TIP

Be able to identify what it means to assimilate and accommodate schemas. Students have confused these terms on the AP® exam in the past.

Sensorimotor Stage

In the **sensorimotor stage,** from birth to nearly age 2, babies take in the world through their senses and actions—through looking, hearing, touching, mouthing, and grasping. As their hands and limbs begin to move, they learn to make things happen.

sensorimotor stage

in Piaget’s theory, the stage (from birth to nearly 2 years of age) during which infants know the world mostly in terms of their sensory impressions and motor activities.

Very young babies seem to live in the present: Out of sight is out of mind. In one test, Piaget showed an infant an appealing toy and then flopped his beret over it. Before the age of 6 months, the infant acted as if the toy ceased to exist. Young infants lack **object permanence**—the awareness that objects continue to exist even when not perceived. By 8 months, infants begin exhibiting memory for things no longer seen. If you hide a toy, the infant will momentarily look for it (**Figure 47.3**). Within another month or two, the infant will look for it even after being restrained for several seconds.

object permanence

the awareness that things continue to exist even when not perceived.

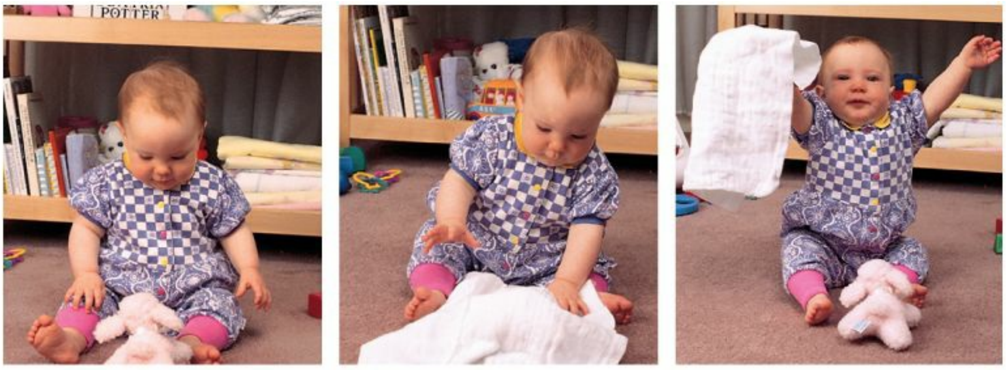


Figure 47.3
Doug Goodman/Science Source

Figure 47.3 Object permanence

Infants younger than 6 months seldom understand that things continue to exist when they are out of sight. But for this older infant, out of sight is definitely not out of mind.

So does object permanence in fact blossom suddenly at 8 months, much as tulips blossom in spring? Today’s researchers believe object permanence unfolds gradually, and they see development as more continuous than Piaget did. Even young infants will at least momentarily look for a toy where they saw it hidden a second before (Wang et al., 2004).

Researchers also believe Piaget and his followers underestimated young children’s competence. Young children think like little scientists. They test ideas, make causal inferences, and learn from statistical patterns (Gopnik et al., 2015). Consider these simple experiments:

- *Baby physics:* Like adults staring in disbelief at a magic trick (the

“*Whoa!*” look), infants look longer at and explore impossible scenes—a car seeming to pass through a solid object, a ball stopping in midair, or an object violating object permanence by magically disappearing (Baillargeon, 2008; Shuwairi & Johnson, 2013; Stahl & Feigenson, 2015). Why do infants show this visual bias? Because impossible events violate infants’ expectations (Baillargeon et al., 2016).

- *Baby math:* Karen Wynn (1992, 2000, 2008) showed 5-month-olds one or two objects (**Figure 47.4**). Then she hid the objects behind a screen, and visibly removed or added one (Figure 47.4d). When she lifted the screen, the infants sometimes did a double take, staring longer when shown a wrong number of objects (Figure 47.4f). But were they just responding to a greater or smaller *mass* of objects, rather than a change in *number* (Feigenson et al., 2002)? Later experiments showed that babies’ number sense extends to larger numbers, to ratios, and to such things as drumbeats and motions (Libertus & Brannon, 2009; McCrink & Wynn, 2004; Spelke et al., 2013). If accustomed to a Daffy Duck puppet jumping three times on stage, they showed surprise if it jumped only twice.

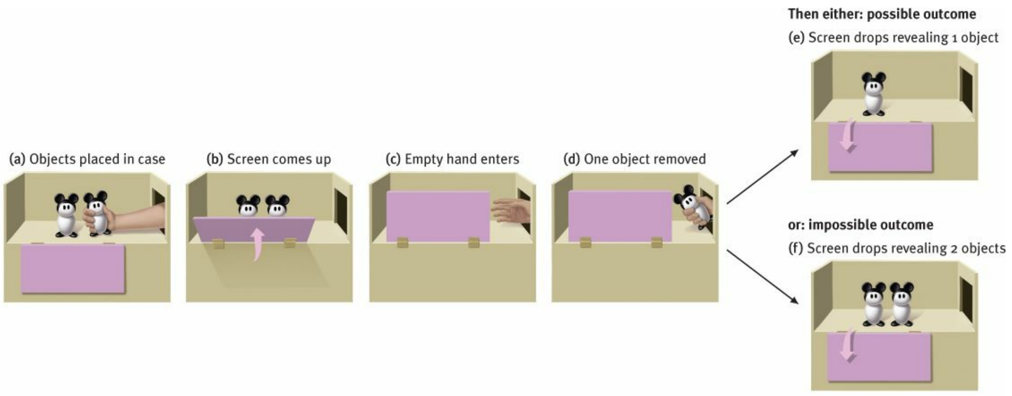

Then either: possible outcome
(e) Screen drops revealing 1 object
(a) Objects placed in case
(b) Screen comes up
(c) Empty hand enters
(d) One object removed
or: impossible outcome
(f) Screen drops revealing 2 objects

Figure 47.4
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 47.4 Baby math

Shown a numerically impossible outcome, 5-month-old infants stare longer (Wynn, 1992).

Clearly, infants are smarter than Piaget appreciated. Even as babies, we had a lot on our minds.

Preoperational Stage

Piaget believed that until about age 6 or 7, children are in a **preoperational stage**—able to represent things with words and images but too young to perform *mental operations* (such as imagining an action and mentally reversing it). For a 5-year-old, the milk that seems "too much" in a tall, narrow glass may become just right if poured into a short, wide glass. Focusing only on the height dimension, this child cannot perform the operation of mentally pouring the milk back. Before about age 6, said Piaget, children lack the concept of **conservation**—the principle that quantity remains the same despite changes in shape (**Figure 47.5**).

preoperational stage

in Piaget's theory, the stage (from about 2 to 6 or 7 years of age) during which a child learns to use language but does not yet comprehend the mental operations of concrete logic.

conservation

the principle (which Piaget believed to be a part of concrete operational reasoning) that properties such as mass, volume, and number remain the same despite changes in the forms of objects.

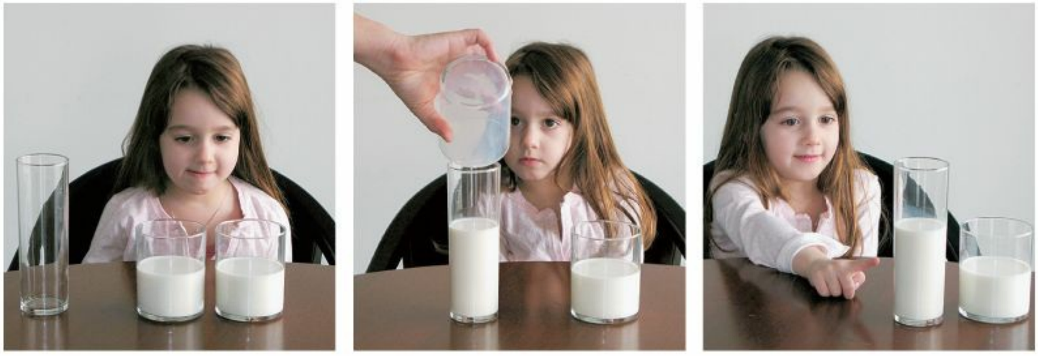


Figure 47.5
Bianca Moscatelli/Worth Publishers

Figure 47.5 Piaget's test of conservation

This visually focused preoperational child does not yet understand the principle of conservation. When the milk is poured into a tall, narrow glass, it suddenly seems like "more" than when it was in the shorter, wider glass. In another year or so, she will understand that the amount stays the same.

Pretend Play

Symbolic thinking and *pretend play* appear at an earlier age than Piaget supposed. Judy DeLoache (1987) discovered this when she showed children a model of a room and hid a miniature stuffed dog behind its miniature couch. The 2½-year-olds easily remembered where to find the miniature toy, but they could not use the model to locate an actual stuffed dog behind a couch in a real room. Three-year-olds—only 6 months older—usually went right to the actual stuffed animal in the real room, showing they *could* think of the model as a symbol for the room. Although Piaget did not view the stage transitions as abrupt, he probably would have been surprised to see symbolic thinking at such an early age.

Egocentrism

Piaget taught us that preschool children are **egocentric:** They have difficulty perceiving things from another's point of view. They are like the person who, when asked by someone across a river, "How do I get to the other side?" answered, "You are on the other side." Asked to "show Mommy your picture," 2-year-old Gabriella holds the picture up facing her own eyes. Three-year-old Gray makes himself "invisible" by putting his hands over his eyes, assuming that if he can't see his grandparents, they can't see him. Children's conversations also reveal their egocentrism, as one young boy demonstrated (Phillips, 1969, p. 61):

egocentrism

in Piaget's theory, the preoperational child's difficulty taking another's point of view.

"*Do you have a brother*?"

"*Yes*."

"What's his name?"

"Jim."

"Does Jim have a brother?"

"No."

David Myers

Egocentrism in action "Look, Granddaddy, a match!" So said my [DM's] granddaughter, Allie, at age 4, when showing me two memory game cards with matching pictures—that faced her.

Like Gabriella, TV-watching preschoolers who block your view of the TV assume that you see what they see. They simply have not yet developed the ability to take another's viewpoint. Even teens and adults may overestimate the extent to which others share our opinions, knowledge, and perspectives. We assume that something will be clear to others if it is clear to us, or that e-mail recipients will "hear" our "just kidding" intent (Epley et al., 2004; Kruger et al., 2005). Perhaps you can recall asking someone to guess a simple tune such as "Happy Birthday" as you clapped or tapped it out. With the tune in your head, it seemed so obvious! But you suffered the egocentric *curse of knowledge,* assuming that what was in your head was also in someone else's.

AP® EXAM TIP

Careful! *Egocentric* is not the same as egotistical. Egocentric means you can't take someone else's point of view. Egotistical means you're pretty full of yourself.

Theory of Mind

When Little Red Riding Hood realized her “grandmother” was really a wolf, she swiftly revised her ideas about the creature’s intentions and raced away. Preschoolers, although still egocentric, develop this ability to infer others’ mental states when they begin forming a **theory of mind** (Premack & Woodruff, 1978).

theory of mind

people’s ideas about their own and others’ mental states—about their feelings, perceptions, and thoughts, and the behaviors these might predict.

Infants as young as 7 months show some knowledge of others’ minds (Kovács et al., 2010). With time, the ability to take another’s perspective develops. They come to understand what made a playmate angry, when a sibling will share, and what might make a parent buy a toy. They begin to tease, empathize, and persuade. And when making decisions, they use their understanding of how their actions will make others feel (Repacholi et al., 2016). Children who have an advanced ability to understand others’ minds tend to be helpful and well-liked (Imuta et al., 2016; Slaughter et al., 2015).

Between about ages 3 and 4½, children come to realize that others may hold false beliefs (Callaghan et al., 2005; Rubio-Fernández & Geurtz, 2013; Sabbagh et al., 2006). Researchers showed Canadian children a Band-Aid box and asked them what was inside (Jenkins & Astington, 1996). Expecting Band-Aids, the children were surprised to discover that the box actually contained pencils. Asked what a child who had never seen the box would think was inside, 3-year-olds typically answered “pencils.” By age 4 to 5, the children’s theory of mind had leapt forward, and they anticipated their friends’ false belief that the box would hold Band-Aids.

In a follow-up experiment, children viewed a doll named Sally leaving her ball in a red cupboard (**Figure 47.6**). Another doll, Anne, then moved the ball to a blue cupboard. Researchers then posed a question: When Sally returns, where will she look for the ball? Children with *autism spectrum disorder* had difficulty understanding that Sally's state of mind differed from their own—that Sally, not knowing the ball had been moved, would return to the red cupboard. They also have difficulty reflecting on their own mental states. They are, for example, less likely to use the personal pronouns *I* and *me*. Deaf children with hearing parents and minimal communication opportunities have had similar difficulty inferring others' states of mind (Peterson & Siegal, 1999).

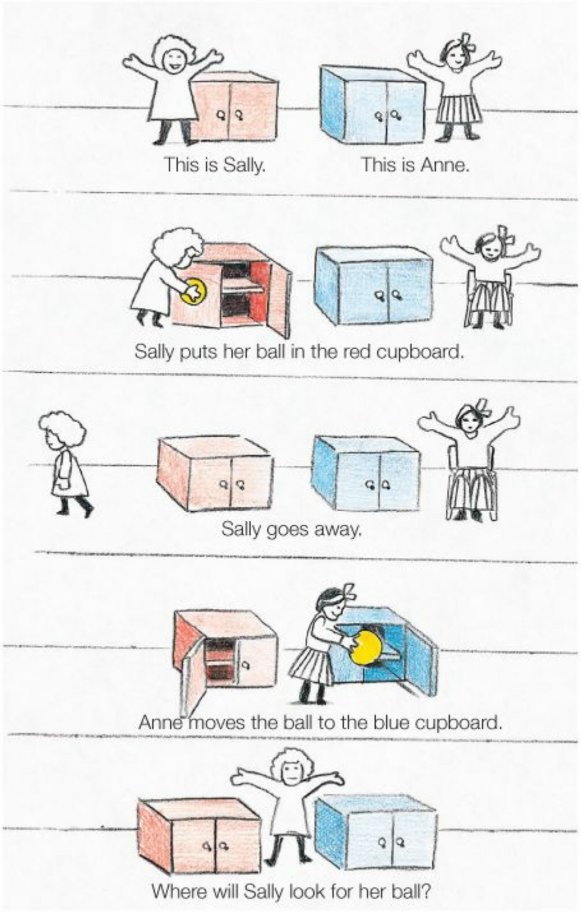

This is Sally.
This is Anne.
Sally puts her ball in the red cupboard.
Sally goes away.
Anne moves the ball to the blue cupboard.
Where will Sally look for her ball?

Figure 47.6
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018
Worth Publishers

Figure 47.6 Testing children's theory of mind

This simple problem illustrates how researchers explore children's presumptions about others' mental states. (Inspired by Baron-Cohen et al., 1985.)

Concrete Operational Stage

By about age 7, said Piaget, children enter the **concrete operational stage**. Given concrete (physical) materials, they begin to grasp operations such as conservation. Understanding that change in form does not mean change in quantity, they can mentally pour milk back and forth between glasses of different shapes. They also enjoy jokes that use this new understanding:

concrete operational stage

in Piaget's theory, the stage of cognitive development (from about 7 to 11 years of age) during which children gain the mental operations that enable them to think logically about concrete events.

> Mr. Jones went into a restaurant and ordered a whole pizza for his dinner. When the waiter asked if he wanted it cut into 6 or 8 pieces, Mr. Jones said, "Oh, you'd better make it 6, I could never eat 8 pieces!" (McGhee, 1976)

Piaget believed that during the concrete operational stage, children become able to comprehend mathematical transformations and conservation. When my [DM's] daughter, Laura, was 6, I was astonished at her inability to reverse simple arithmetic. Asked, "What is 8 plus 4?" she required 5 seconds to compute "12," and another 5 seconds to then compute 12 minus 4. By age 8, she could answer a reversed question instantly.

Formal Operational Stage

By age 12, our reasoning expands from the purely concrete (involving actual experience) to encompass abstract thinking (involving imagined realities and symbols). As children approach adolescence, said Piaget, they can ponder hypothetical propositions and deduce consequences: *If* this, *then* that. Systematic reasoning, what Piaget called **formal operational** thinking, is now within their grasp.

formal operational stage

in Piaget’s theory, the stage of cognitive development (normally beginning about age 12) during which people begin to think logically about abstract concepts.

Although full-blown logic and reasoning await adolescence, the rudiments of formal operational thinking begin earlier than Piaget realized. Consider this simple problem:

> If John is in school, then Mary is in school. John is in school. What can you say about Mary?

Image Source/Getty Images

Pretend play

AP® EXAM TIP

One good way to master the developmental milestones in Piaget’s theory is to see them in action. If you know children of various ages, you can test them using some of the ideas presented in this section. Hide a toy from an infant to see object permanence in action. Pour water between two differently shaped glasses to see if a preschooler understands conservation.

Formal operational thinkers have no trouble answering correctly. But neither do most 7-year-olds (Suppes, 1982). **Table 47.1** summarizes the four stages in Piaget's theory.

TABLE 47.1 Piaget's Stages of Cognitive Development

Typical Age Range	**Stage and Description**	**Key Milestones**
Birth to nearly 2 years	*Sensorimotor* Experiencing the world through senses and actions (looking, hearing, touching, mouthing, and grasping)	• Object permanence • Stranger anxiety
About 2 to 6 or 7 years	*Preoperational* Representing things with words and images; using intuitive rather than logical reasoning	• Pretend play • Egocentrism
About 7 to 11 years	*Concrete operational* Thinking logically about concrete events; grasping concrete analogies and performing arithmetical operations	• Conservation • Mathematical transformations
About 12 through adulthood	*Formal operational* Reasoning abstractly	• Abstract logic • Potential for mature moral reasoning

An Alternative Viewpoint: Lev Vygotsky and the Social Child

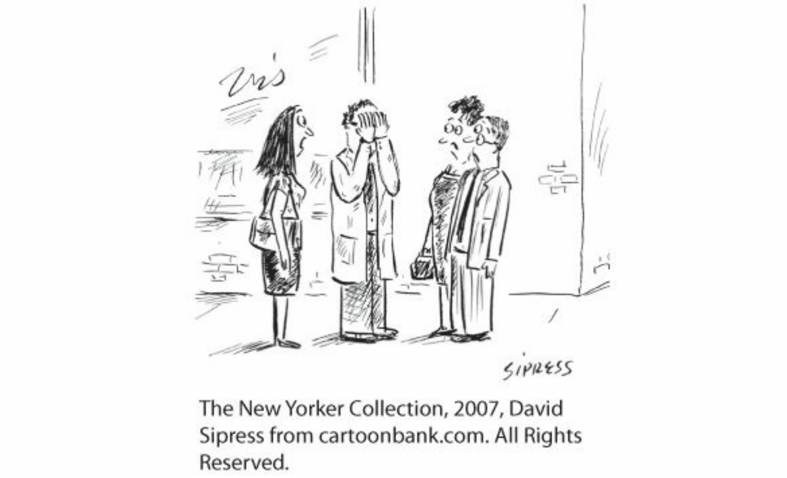
As Piaget was forming his theory of cognitive development, Russian psychologist Lev Vygotsky was also studying how children think and learn. Where Piaget emphasized how the child's mind grows through interaction with the physical environment, Vygotsky emphasized how the child's mind grows through interaction with the *social* environment. If Piaget's child was a young scientist, Vygotsky's was a young apprentice. By giving children new words and mentoring them, parents and teachers provide what we now call a temporary **scaffold** from which children can step to higher levels of thinking (Wood et al., 1976).

scaffold

a framework that offers children temporary support as they develop higher levels of thinking.

James V. Wertsch/Washington University

Lev Vygotsky (1896–1934) Vygotsky, pictured here with his daughter, was a Russian developmental psychologist. He studied how a child's mind feeds on the language of social interaction.



The New Yorker Collection, 2007, David Sipress from cartoonbank.com. All Rights Reserved.

"It's too late, Roger—they've seen us."

Roger has not outgrown his early childhood egocentrism.

Effective mentoring occurs when children are developmentally ready to learn a new skill. For Vygotsky, a child's *zone of proximal development* is the zone between what a child can and can't do—it's what a child can do with help. When learning to ride a bike, it's the developmental zone in which a child can ride with training wheels or a steadying parental hand. Children learn best when their social environment presents them with something in the sweet spot between too easy and too difficult.

Language, an important ingredient of social mentoring, provides the building blocks for thinking, noted Vygotsky (who was born the same year as Piaget, but died prematurely of tuberculosis). By age 7, children increasingly think in words and use words to solve problems. They do this, Vygotsky said, by internalizing their culture's language and relying on inner speech (Fernyhough, 2008). Parents who say, "*No, no, Bevy*!" when pulling her hand away from a cup of hot coffee are giving their child a self-control tool. Second graders who muttered to themselves while doing math problems grasped third-grade math better the following year (Berk, 1994). Whether out loud or inaudibly, talking to themselves helps children control their behavior and emotions and master new skills. (It helps adults, too. Adults who motivate themselves using self-talk—"You can do it!"—experience better performance [Kross et al., 2014].)

✓ Check Your Understanding

Ask Yourself

- Can you think of an example from your own childhood, or perhaps that of a sibling, that illustrates one of the theories of cognitive development discussed in this section?

Test Yourself

- Match the correct cognitive developmental stage (a–d) to each developmental phenomenon (1–6).

a. Sensorimotor
b. Preoperational
c. Concrete operational
d. Formal operational

1. Thinking about abstract concepts, such as "freedom."
2. Enjoying imaginary play (such as dress-up).
3. Understanding that physical properties stay the same even when objects change form.
4. Having the ability to reverse math operations.
5. Understanding that something is not gone for good when it disappears from sight, as when Mom "disappears" behind the shower curtain.
6. Having difficulty taking another's point of view (as when blocking someone's view of the TV).

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Reflecting on Piaget’s Theory

What remains of Piaget’s ideas about the child’s mind? Plenty—enough to merit his being singled out by *Time* magazine as one of the twentieth century’s 20 most influential scientists and thinkers, and his being rated in a survey of British psychologists as the last century’s greatest psychologist (*Psychologist*, 2003). Piaget identified significant cognitive milestones and stimulated worldwide interest in how the mind develops. His emphasis was less on the ages at which children typically reach specific milestones than on their sequence. Studies around the globe, from aboriginal Australia to Algeria to North America, have confirmed that human cognition unfolds basically in the sequence Piaget described (Lourenco & Machado, 1996; Segall et al., 1990).

AP® EXAM TIP

Jean Piaget’s developmental stages are likely the topic of at least one AP® exam question. It may help to remember that for Piaget, children are little scientists, and for Vygotsky children are little apprentices.

However, today’s researchers see development as more continuous than did Piaget. By detecting the beginnings of each type of thinking at earlier ages, they have revealed conceptual abilities Piaget missed. Moreover, they see formal logic as a smaller part of cognition than he did. Today, as part of our own cognitive development, we are adapting Piaget’s ideas to accommodate new findings.

> “*Assessing the impact of Piaget on developmental psychology is like assessing the impact of Shakespeare on English literature.*”
>
> *Developmental psychologist Harry Beilin (1992)*

Implications for Parents and Teachers

Future parents and teachers remember: Young children are incapable of adult logic. Preschoolers who block one’s view of the TV simply have not learned to take another’s viewpoint. What seems simple and obvious to us —getting off a teeter-totter will cause a friend on the other end to crash— may be incomprehensible to a 3-year-old. Also remember that children are not passive receptacles waiting to be filled with knowledge. Better to build on what they already know, engaging them in concrete demonstrations and stimulating them to think for themselves. And, finally, accept children’s cognitive immaturity as adaptive. It is nature’s strategy for keeping children close to protective adults and providing time for learning and socialization (Bjorklund & Green, 1992).

> “ *Childhood has its own way of seeing, thinking, and feeling, and there is nothing more foolish than the attempt to put ours in its place.* ”
>
> *Philosopher Jean-Jacques Rousseau, 1798*

Autism Spectrum Disorder

47-2 What is *autism spectrum disorder*, and how does it affect development?

Diagnoses of **autism spectrum disorder (ASD)**, a disorder marked by social deficiencies and repetitive behaviors, have been increasing. Once believed to affect 1 in 2500 children (and referred to simply as *autism*), ASD now gets diagnosed in 1 in 68 American children by age 8. But the reported rates vary by place, with New Jersey having four times the reported prevalence of Alabama, while Britain's children have a 1 in 100 rate, and South Korea's 1 in 38 (CDC, 2014; Kim et al., 2011; NAS, 2011). The increase in ASD diagnoses has been offset by a decrease in the number of children with a "cognitive disability" or "learning disability," which suggests a relabeling of children's disorders (Gernsbacher et al., 2005; Grinker, 2007; Shattuck, 2006).

autism spectrum disorder (ASD)

a disorder that appears in childhood and is marked by significant deficiencies in communication and social interaction, and by rigidly fixated interests and repetitive behaviors.

Ozier Muhammad/The New York Times/Redux Pictures

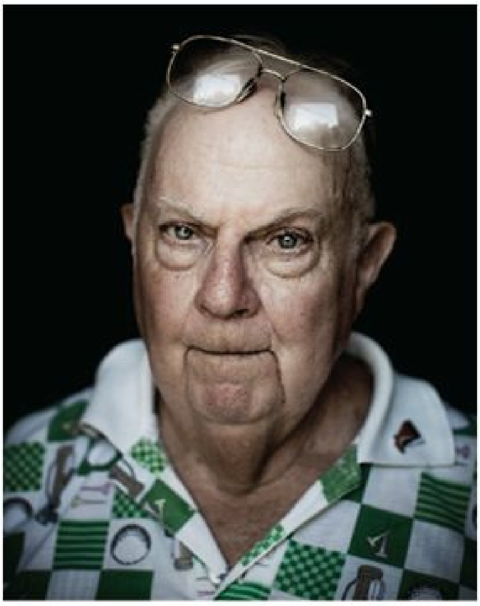
Autism spectrum disorder This speech-language pathologist is helping a boy with ASD learn to form sounds and words. ASD is marked by deficient social communication and difficulty grasping others’ states of mind.

The underlying source of ASD’s symptoms seems to be poor communication among brain regions that normally work together to let us take another’s viewpoint. From age 2 months on, as other children spend more and more time looking into others’ eyes, those who later develop ASD do so less and less (Jones & Klin, 2013). People with ASD are said to have an *impaired theory of mind* (Rajendran & Mitchell, 2007; Senju et al., 2009). Mind reading that most of us find intuitive *(Is that face conveying a smirk or a sneer?)* is difficult for those with ASD. They have difficulty inferring and remembering others’ thoughts and feelings, appreciating that playmates and parents might view things differently, and understanding that their teachers know more than they do (Boucher et al., 2012; Frith & Frith, 2001; Knutsen et al., 2015). Partly for such reasons, a national survey of parents and school staff reported that 46 percent of adolescents with ASD had suffered the taunts and torments of bullying—four times the 11 percent rate for other children (Sterzing et al., 2012). Children with ASD do make friends, but their peers often find such relationships emotionally unsatisfying (Mendelson et al., 2016).

ASD has differing levels of severity. About half of people with ASD experience a “fair” or even “good” outcome (Steinhausen et al., 2016). Some (those diagnosed with what used to be called *Asperger syndrome*) generally function at a high level. They have normal intelligence, often accompanied by exceptional skill or talent in a specific area, but deficient social and communication skills and a tendency to become distracted by irrelevant stimuli (Remington et al., 2009). Those at the spectrum’s more severe end struggle to use language.

Biological factors, including genetic influences and abnormal brain development, contribute to ASD (Colvert et al., 2015; Makin, 2015; Tick et al., 2015). Studies suggest that the prenatal environment matters, especially when altered by maternal infection and inflammation, psychiatric drug use, or stress hormones (NIH, 2013; Wang, 2014). Childhood vaccinations do *not* contribute to ASD (Taylor et al., 2014).

Based on a fraudulent 1998 study—“the most damaging medical hoax of the last 100 years” (Flaherty, 2011)—some parents were misled into thinking that the childhood MMR vaccine increased risk of ASD. The unfortunate result was a drop in vaccination rates and an increase in cases of measles and mumps. Some unvaccinated children suffer long-term harm or even death. Unvaccinated children also place those children too young to be fully vaccinated at risk.



Miller Mobley/August Image

“Autism” case number 1 In 1943, Donald Gray Triplett, an “odd” child with unusual gifts and social deficits, was the first person to receive the diagnosis of “autism.” (After a 2013 change in the diagnosis manual, his condition is now called *autism spectrum disorder*.) In 2016, at age 82, Triplett was still living in his family home and Mississippi town, where he often played golf (Atlas, 2016).

ASD afflicts about three boys for every girl (Loomes et al., 2017). Psychologist Simon Baron-Cohen (2010) believes this is because boys are often “systemizers.” They tend to understand things according to rules or laws, as in mathematical and mechanical systems. Girls, he contends, are naturally predisposed to be “empathizers.” They tend to excel at reading facial expressions and gestures (van Honk et al., 2011). And whether male or female, those with ASD are systemizers who have more difficulty reading facial expressions (Baron-Cohen et al., 2015).

Numerous studies verify biology’s influence. If one identical twin is diagnosed with ASD, the chances are 50 to 70 percent that the co-twin will be as well (Tick et al., 2015). A younger genetic sibling of a child with ASD also is at a heightened risk (Sutcliffe, 2008). No one “autism gene” accounts for the disorder. Rather, many genes—with more than 400 identified so far—appear to contribute (Krishnan et al., 2016; Yuen et al., 2016). Random genetic mutations in sperm cells may also play a role. As men age, these mutations become more frequent, which may help explain why an over-40 man has a much higher risk of fathering a child with ASD than does a man under 30 (Wu et al., 2017).

Researchers are also sleuthing ASD’s telltale signs in the brain’s structure. Several studies have revealed “underconnectivity”—fewer-than-normal fiber tracts connecting the front of the brain to the back (Picci et al., 2016). With underconnectivity, there is less of the whole-brain synchrony that, for example, integrates visual and emotional information.

Biology’s role in ASD also appears in the brain’s functioning. People without ASD often yawn after seeing others yawn. And as they view and imitate another’s smiling or frowning, they feel something of what the other is feeling. Not so among those with ASD, who are less imitative and show less activity in brain areas involved in mirroring others’ actions (Edwards, 2014; Yang & Hoffman, 2015). When people with ASD watch another person’s hand movements, for example, their brain displays less-than-normal mirroring activity (Oberman & Ramachandran, 2007; Théoret et al., 2005). Scientists are exploring and debating this idea that the brains of people with ASD have “broken mirrors” (Gallese et al., 2011; Schulte-Rüther et al., 2016). And they are exploring whether treatment with oxytocin, the hormone that promotes social bonding, might improve social understanding in those with ASD (Gordon et al., 2013; Lange & McDougle, 2013).

Lisa Wiltse/Corbis News/Getty Images

Sharing more than appearance Twins Johanna and Eva share a genetically influenced mild ASD.

Seeking to “systemize empathy,” Baron-Cohen and his Cambridge University colleagues (2007; Golan et al., 2010) collaborated with Britain’s National Autistic Society and a film production company. Knowing that television shows with vehicles have been popular among kids with ASD, they created animations with toy vehicle characters in a pretend boy’s bedroom, grafting emotion-conveying faces onto toy trams, trains, and tractors (**Figure 47.7**). After the boy leaves for school, the characters come to life and have experiences that lead them to display various emotions (see TheTransporters.com). The children were surprisingly able to generalize what they had learned to a new, real-life context. By the intervention’s end, their previously deficient ability to recognize emotions on real faces now equaled that of children without ASD.

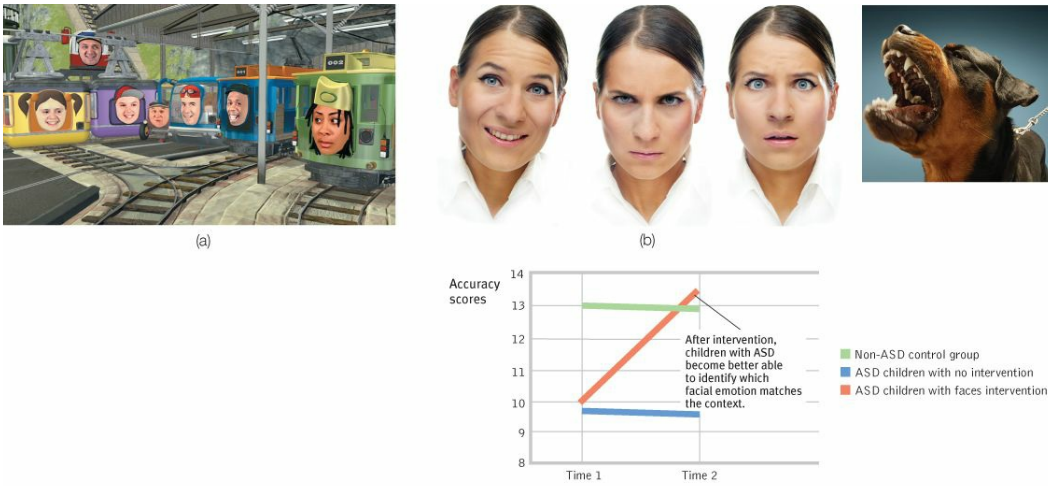


Figure 47.7
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
(a) Simon Baron-Cohen, Crown Copyright MMVI, www.thetransporters.com courtesy Changing Media Development;
(b) VikaValter/Getty Images;
Top Right photo: © moodboard/Corbis

Figure 47.7 Transported into a world of emotion

A research team at Cambridge University's Autism Research Centre introduced children with ASD to emotions experienced and displayed by (a) toy vehicles and (b) human faces. Children matched the correct face with the story ("The neighbor's dog has bitten people before. He is barking at Louise. Point to the face that shows how Louise is feeling"). (The graph shows data for two trials.)

✓ Check Your Understanding

Ask Yourself

- Can you recall a time when you misheard some song lyrics because you assimilated them into your own schema? (For hundreds of examples of this phenomenon, visit kissthisguy.com.)

Test Yourself

- Use Piaget's first three stages of cognitive development to explain why children are not just miniature adults in the way they think.
- What does theory of mind have to do with autism spectrum disorder?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 47 REVIEW

47-1 From the perspectives of Piaget, Vygotsky, and today's researchers, how does a child's mind develop?

- In his theory of *cognitive* development, Jean Piaget proposed that children actively construct and modify their understanding of the world through the processes of *assimilation* and *accommodation.* They form *schemas* that help them organize their experiences.
- Progressing from the simplicity of the *sensorimotor stage* of the first two years, in which they develop *object permanence,* children move to more complex ways of thinking.
- In the *preoperational stage* (about age 2 to about 6 or 7), they develop a *theory of mind,* but they are *egocentric* and are unable to perform simple logical operations.
- By age 7, they enter the *concrete operational stage* and are able to comprehend the principle of *conservation.*
- By age 12, children enter the *formal operational stage* and can reason systematically.
- Research supports the sequence Piaget proposed, but it also shows that young children are more capable, and their development is more continuous, than he believed.
- Lev Vygotsky's studies of child development focused on the ways a child's mind grows by interacting with the social environment. In his view, parents and caretakers provide what we now call temporary *scaffolds* enabling children to step to higher levels of learning.

47-2 What is *autism spectrum disorder,* and how does it affect development?

- *Autism spectrum disorder (ASD)* is a disorder marked by social deficiencies and repetitive behaviors.

- Genetic influences, abnormal brain development, and the prenatal environment—especially when altered by infection, drugs, or hormones—likely contribute to ASD.
- An impaired theory of mind makes it difficult for those with ASD to understand others' point of view.
- People with ASD experience different severities of the disorder. Some function at a high level, while others struggle to use language.

Multiple-Choice Questions

1. Your friend's baby brother, Matt, loves to play with his pet cat. When he sees a puppy, he points and calls it "Mi Mi," which is what he calls his cat. Matt is demonstrating Piaget's process of

a. conservation.
b. accommodation.
c. cognition.
d. object permanence.
e. assimilation.

2. If you showed a 2-year-old a model of her bedroom where you'd hidden a toy behind the bed, she would

a. understand that the model represented her room, but not be able to find the toy in her own room.
b. exhibit schematic thinking and be able to explain the study back to you.
c. be unable to find the toy in her room due to a lack of symbolic thinking.
d. understand that the model represented her room, and be able to find the toy in her own room.
e. misunderstand the instructions due to her lack of theory of mind.

3. Vygotsky called the space between what a child could learn with and without help the

a. theory of mind.

b. zone of abstract logic.
c. zone of abstract reasoning.
d. zone of proximal development.
e. zone of developmental readiness.

4. Which of the following is a current belief of researchers that differs from Piaget's original theories?

a. Infants simply have less information about the world than older children and adults.
b. Object permanence develops earlier than Piaget believed.
c. Infants learn more by verbal explanations than Piaget believed.
d. Accommodation is a process that doesn't occur in young children.
e. Schemas don't form until later than Piaget believed.

5. Which of the following cognitive abilities is possible only at the formal operational stage?

a. Reversing arithmetic operations
b. Using a theory of mind to predict the behavior of others
c. Using hypothetical situations as the basis of moral reasoning
d. Using symbolic thinking for pretend play
e. Understanding basic physics to recognize impossible situations

6. A 4-year-old child comes into the room and tells her parent, "I broke it" without feeling the need to tell her parent what is broken because

a. the child lacks an understanding of conservation.
b. the child is afraid of being punished.
c. the child's cannot remember what was broken.
d. the child has assimilated the object into her memory.
e. the child is egocentric.

7. Which of the following would indicate that a child understands conservation?

a. She would continue to seek a toy hidden under a blanket.
b. She would "hide" in a game of hide-and-seek by covering her eyes with her hands.

c. She would believe that a clay snake would have the same amount of clay as the clay ball that was used to make it.
d. She would recognize that 7 + 3 involves the same mathematical relationship as 10 – 7.
e. She would be able to comprehend the logic of if-then statements.

Practice FRQs

1. Describe how Lev Vygotsky viewed the role of the following in a child’s cognitive development:

- Language
- Scaffolding (modern-day term)
- Zone of proximal development

How did his theory differ from that of Jean Piaget?

Answer

1 point: Vygotsky believed that as children grow, they increasingly use words to solve problems and think. Adults help with this process by giving them words to internalize behaviors. Page 504

1 point: Scaffolding is the way in which parents and others provide a framework that offers children temporary support as they move to higher levels of cognitive development. Page 503

1 point: The zone of proximal development describes the space between what a child could learn with and without help. Page 503

1 point: The major difference is that Piaget thought cognitive development resulted from children’s interactions with their physical environment, while Vygotsky believed they learned through social interactions. Page 503

2. Give an example of each of the cognitive milestones listed below:

- Object permanence

- Conservation
- Theory of mind

(3 points)

Module **48 Infancy and Childhood: Social Development**

LEARNING TARGETS

- 48-1 Describe how parent-infant attachment bonds form.
- 48-2 Explain how psychologists have studied attachment differences, and synthesize what they have learned.
- 48-3 Discuss how childhood neglect or abuse affects children's attachments.
- 48-4 Trace the onset and development of children's self-concepts.
- 48-5 Describe the four main parenting styles.
- 48-6 Describe the outcomes that are associated with each parenting style.

48-1 How do parent-infant attachment bonds form?

From birth, most babies are social creatures, developing an intense attachment to their caregivers. Infants come to prefer familiar faces and voices, then coo and gurgle when given a parent's attention. After about 8 months, soon after object permanence emerges and children become mobile, a curious thing happens: They develop **stranger anxiety**. They may greet strangers by crying and reaching for familiar caregivers: "No! Don't leave me!" Children this age have schemas for familiar faces; when they cannot assimilate the new face into these remembered schemas, they become distressed (Kagan, 1984). Once again, we see an important principle: *The brain, mind, and social-emotional behavior develop together*.

stranger anxiety

the fear of strangers that infants commonly display, beginning by about 8 months of age.

Origins of Attachment

One-year-olds typically cling tightly to a parent when they are frightened or expect separation. Reunited after being apart, they often shower the parent with smiles and hugs. This striking parent-infant **attachment** bond is a powerful survival impulse that keeps infants close to their caregivers. Infants normally become attached to those—typically their parents—who are comfortable and familiar. For many years, psychologists reasoned that infants became attached to those who satisfied their need for nourishment. But an accidental finding overturned this explanation.

attachment

an emotional tie with another person; shown in young children by their seeking closeness to their caregiver and showing distress on separation.

Body Contact

During the 1950s, University of Wisconsin psychologists Harry Harlow and Margaret Harlow bred monkeys for their learning studies. To equalize experiences and to isolate any disease, they separated the infant monkeys from their mothers shortly after birth and raised them in individual cages, each including a cheesecloth baby blanket (Harlow et al., 1971). Then came a surprise: When their soft blankets were taken to be washed, the monkeys became distressed.

Christina Kennedy/PhotoEdit

Stranger anxiety A newly emerging ability to evaluate people as unfamiliar and possibly threatening helps protect babies 8 months and older.

The Harlows recognized that this intense attachment to the blanket contradicted the idea that attachment derives from an association with nourishment. But how could they show this more convincingly? To pit the drawing power of a food source against the contact comfort of the blanket, they created two artificial mothers. One was a bare wire cylinder with a wooden head and an attached feeding bottle, the other a cylinder wrapped with terry cloth.

When raised with both, the monkeys overwhelmingly preferred the comfy cloth mother (**Figure 48.1**). Like other infants clinging to their live mothers, the monkey babies would cling to their cloth mothers when anxious. When exploring their environment, they used her as a *secure base,* as if attached to her by an invisible elastic band that stretched only so far before pulling them back. Researchers soon learned that other qualities—rocking, warmth, and feeding—made the cloth mother even more appealing.

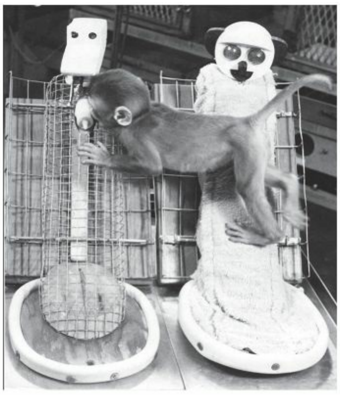


Figure 48.1
Science Source

Figure 48.1 The Harlows' monkey mothers

Psychologists Harry Harlow and Margaret Harlow raised monkeys with two artificial mothers—one a bare wire cylinder with a wooden head and an attached feeding bottle, the other a cylinder with no bottle but covered with foam rubber and wrapped with terry cloth. The Harlows' discovery surprised many psychologists: The infants much preferred contact with the comfortable cloth mother, even while feeding from the wire nourishing mother.

Human infants, too, become attached to parents who are soft and warm and who rock, feed, and pat. Much parent-infant emotional communication occurs via touch, which can be either soothing (snuggles) or arousing (tickles) (Hertenstein et al., 2006). Indeed, when asked to describe the ideal mother, people across the globe agreed that she “shows affection by touching” (Mesman et al., 2015). Human attachment also consists of one person providing another with a secure base from which to explore and a safe haven when distressed. As we mature, our secure base and safe haven shift—from parents to peers and partners (Cassidy & Shaver, 1999). But at all ages we are social creatures. We gain strength when someone offers, by words and actions, a safe haven: “I will be here. I am interested in you. Come what may, I will support you” (Crowell & Waters, 1994).

FYI

For some people, a perceived relationship with God functions as do other attachments, by providing a secure base for exploration and a safe haven when threatened (Granqvist et al., 2010; Kirkpatrick, 1999).

Familiarity

Contact is one key to attachment. Another is familiarity. In many animals, attachments based on familiarity form during a **critical period**—an optimal period when certain events must take place to facilitate proper development (Bornstein, 1989). For goslings, ducklings, or chicks, that period falls in the hours shortly after hatching, when the first moving object they see is normally their mother. From then on, the young fowl follow her, and her alone.

critical period
an optimal period early in the life of an organism when exposure to certain stimuli or experiences produces normal development.

Konrad Lorenz (1937) explored this rigid attachment process, called

imprinting. He wondered: What would ducklings do if he was the first moving creature they observed? What they did was follow him around: Everywhere that Konrad went, the ducks were sure to go. Although baby birds imprint best to their own species, they also will imprint to a variety of moving objects—an animal of another species, a box on wheels, a bouncing ball (Colombo, 1982; Johnson, 1992). Once formed, this attachment is difficult to reverse.

imprinting

the process by which certain animals form strong attachments during early life.

Mark Peterson/Redux Pictures

Imprinting Whooping cranes normally learn to migrate by following their parents. These cranes, hand-raised from eggs, imprinted on a crane-costumed ultralight pilot, who then guided them to winter nesting grounds (Mooallem, 2009).

Children—unlike ducklings—do not imprint. However, they do become attached, during a less precisely defined *sensitive period*, to what they've known. *Mere exposure* to people and things fosters fondness (see Module 79). Children like to reread the same books, rewatch the same movies, reenact family traditions. They prefer to eat familiar foods, live in the same familiar neighborhood, attend school with the same old friends. Familiarity is a safety signal. Familiarity breeds content.

Attachment Differences: Temperament and Parenting

48-2 How have psychologists studied attachment differences, and what have they learned?

What accounts for children’s attachment differences? To answer this question, Mary Ainsworth (1979) designed the **strange situation** experiment. She observed mother-infant pairs at home during their first six months. Later she observed the 1-year-old infants in a strange situation (usually a laboratory playroom) with and without their mothers. Such research has shown that about 60 percent of infants and young children display **secure attachment** (Moulin et al., 2014). In their mother’s presence they play comfortably, happily exploring their new environment. When she leaves, they become distressed; when she returns, they seek contact with her.

strange situation

a procedure for studying child-caregiver attachment; a child is placed in an unfamiliar environment while their caregiver leaves and then returns, and the child’s reactions are observed.

secure attachment

demonstrated by infants who comfortably explore environments in the presence of their caregiver, show only temporary distress when the caregiver leaves, and find comfort in the caregiver’s return.

Other infants show **insecure attachment,** marked either by *anxiety* or by *avoidance* of trusting relationships. These infants are less likely to explore their surroundings; they may even cling to their mother. When she leaves, they either cry loudly and remain upset or seem indifferent to her departure and return (Ainsworth, 1973, 1989; Kagan, 1995; van IJzendoorn & Kroonenberg, 1988).

insecure attachment

demonstrated by infants who display either a clinging, *anxious attachment* or an *avoidant attachment* that resists closeness.

Ainsworth and others found that sensitive, responsive mothers—those who noticed what their babies were doing and responded appropriately—had infants who exhibited secure attachment (De Wolff & van IJzendoorn, 1997). Insensitive, unresponsive mothers—mothers who attended to their babies when they felt like doing so but ignored them at other times—often had infants who were insecurely attached. The Harlows' monkey studies, with unresponsive artificial mothers, produced even more striking effects. When put in strange situations without their artificial mothers, the deprived infants were terrified (**Figure 48.2**).

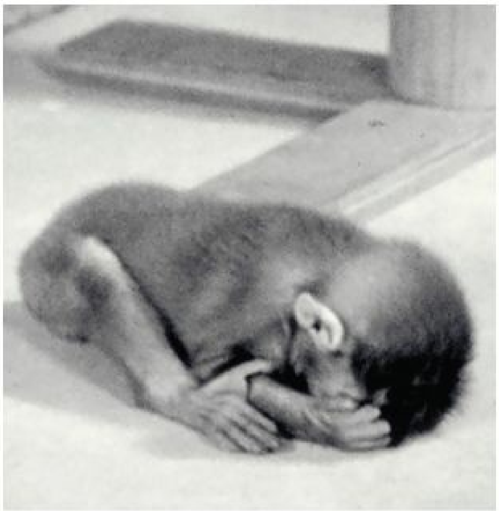


Figure 48.2
Science Source

Figure 48.2 **Social deprivation and fear**

In the Harlows' experiments, monkeys raised with inanimate surrogate mothers were overwhelmed when placed in strange situations without that source of emotional security. (Today there is greater oversight and concern for animal welfare, which would regulate this type of study.)

Although remembered by some as the researcher who tortured helpless monkeys, Harry Harlow defended his methods: “Remember, for every mistreated monkey there exist a million mistreated children,” he said, expressing the hope that his research would sensitize people to child abuse and neglect. “No one who knows Harry’s work could ever argue that babies do fine without companionship, that a caring mother doesn’t matter,” noted Harlow biographer Deborah Blum (2011, pp. 292, 307). “And since we . . . didn’t fully believe that before Harry Harlow came along, then perhaps we needed—just once—to be smacked really hard with that truth so that we could never again doubt.”

So, caring parents matter. But is attachment style the *result* of parenting? Or is attachment style the result of genetically influenced **temperament**—a person’s characteristic emotional reactivity and intensity?

temperament

a person’s characteristic emotional reactivity and intensity.

As most parents will tell you after having their second child, babies differ even before gulping their first breath. Temperament is quickly apparent, and it is genetically influenced (Kandler et al., 2013; Raby et al., 2012). Identical twins, more than fraternal twins, often have similar temperaments (Fraley & Tancredy, 2012; Kandler et al., 2013). Twin and developmental studies reveal that heredity affects temperament, and temperament affects attachment style (Picardi et al., 2011; Raby et al., 2012). Shortly after birth, some babies are noticeably *difficult*—irritable, intense, and unpredictable. Others are *easy*—cheerful, relaxed, and feeding and sleeping on predictable schedules (Chess & Thomas, 1987). This helps explain why parenting correlates with children’s behavior; it’s partly because children with difficult temperaments elicit and react more to negative parenting (Slagt et al., 2016).

And temperament differences typically persist. The most emotionally reactive newborns tend also to be the most reactive 9-month-olds (Wilson

& Matheny, 1986; Worobey & Blajda, 1989). Emotionally intense preschoolers tend to become relatively intense young adults (Larsen & Diener, 1987). In one study of more than 900 New Zealanders, emotionally reactive and impulsive 3-year-olds developed into somewhat more impulsive, aggressive, and crime-prone adults (Caspi et al, 2016).

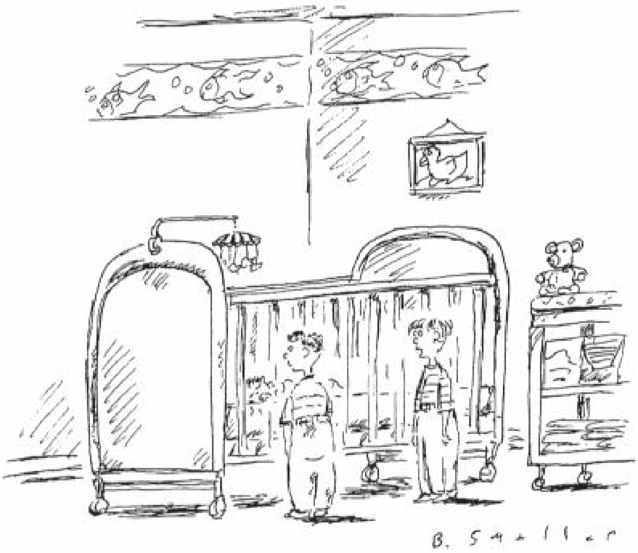
The genetic effect appears in physiological differences. Anxious, inhibited infants have high and variable heart rates and a reactive nervous system. When facing new or strange situations, they become more physiologically aroused (Kagan & Snidman, 2004; Roque et al., 2012).

AP® EXAM TIP

Note that temperament is a contribution from the nature side of the nature–nurture debate.

By neglecting such inborn differences, the parenting studies, noted Judith Harris (1998), are like "comparing foxhounds reared in kennels with poodles reared in apartments." So to separate nature and nurture, we would need to vary parenting while controlling temperament. (Pause and think: If you were the researcher, how might you do this?)

One Dutch researcher's solution was to randomly assign 100 temperamentally difficult 6- to 9-month-olds to either an experimental group, in which mothers received personal training in sensitive responding, or to a control group, in which they did not (van den Boom, 1994). At 12 months of age, 68 percent of the infants in the experimental group were securely attached, as were only 28 percent of the control-group infants. Other studies have confirmed that intervention programs can increase parental sensitivity and, to a lesser extent, infant attachment security (Bakermans-Kranenburg et al., 2003; Van Zeijl et al., 2006).



Barbara Smaller The New Yorker Collection/The Cartoon Bank

"Oh, he's cute, all right, but he's got the temperament of a car alarm."

As these examples indicate, researchers have more often studied mother care than father care. Infants who lack a caring mother are said to suffer "maternal deprivation"; those lacking a father's care merely experience "father absence." This reflects a wider attitude in which "fathering a child" has meant impregnating, and "mothering" has meant nurturing. But fathers are more than just mobile sperm banks. Across nearly 100 studies worldwide, a father's love and acceptance have been comparable with a mother's love in predicting their offspring's health and well-being (Rohner & Veneziano, 2001; see also **Table 48.1**). In one mammoth British study following 7259 children from birth to adulthood, those whose fathers were most involved in parenting (through outings, reading to them, and taking an interest in their education) tended to achieve more in school, even after controlling for other factors such as parental education and family wealth (Flouri & Buchanan, 2004). Increasing nonmarital births and the greater instability of cohabiting versus married partnerships has, however, meant more father-absent families (Hymowitz et al., 2013). In Europe and the United States, for example, children born to cohabiting parents are (compared to those with married parents) nearly twice as likely to experience their parents' separation, which often entails diminished father care (Wilcox & DeRose, 2017).

TABLE 48.1 Co-Parenting Positives

TABLE 48.1 Co-Parenting Positives

- *Active dads are caregiving more.* Today's co-parenting fathers are more engaged, with a doubling in the weekly hours spent with their children, compared with fathers in 1965 (Livingston & Parker, 2011).
- *Couples that share housework and child care are happier in their relationships and less divorce prone* (Wilcox & Marquardt, 2011).
- *Co-parenting supports children.* After controlling for other factors, children average better life outcomes "if raised by both parents" (Taylor, 2014).
- *Parents' genders do not affect children's well-being.* The American Academy of Pediatrics (2013) reports that what matters is competent, secure, nurturing parents, regardless of their gender and sexual orientation. The American Sociological Association (2013) concurs: Decades of research confirm that parental stability and resources matter. "Whether a child is raised by same-sex or opposite-sex parents has no bearing on a child's well-being."

Children's anxiety over separation from parents peaks at around 13 months, then gradually declines (**Figure 48.3**). This happens whether they live with one parent or two, are cared for at home or in day care, live in North America, Guatemala, or the Kalahari Desert. Does this mean our need for and love of others also fades away? Hardly. Our capacity for love grows, and our pleasure in touching and holding those we love never ceases.

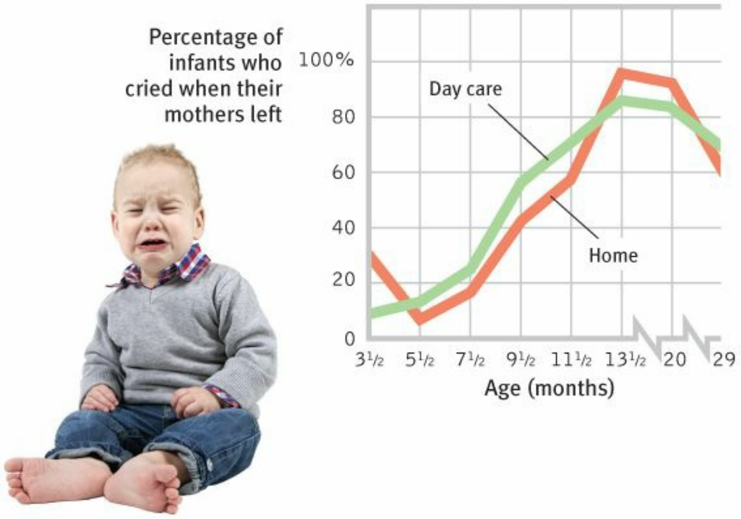


Figure 48.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Photo: Jouke van Keulen/Shutterstock

Figure 48.3 Infants' distress over separation from parents

In an experiment, infants were left by their mothers in an unfamiliar room. Regardless of whether the infant had experienced day care, the percentage who cried when the mother left peaked at about 13 months of age (Kagan, 1976).

Left: robertharding/Alamy; Right: Brad Zweerink/ZUMA Press/Newscom

Parenting is for dads, too Emperor penguin dads may lose half their body weight over the two months they spend keeping a precious egg warm during the harsh Antarctic winter. After mom returns from the sea, both parents take turns caring for and feeding the chick.

Full-time dad Financial analyst Walter Cranford, shown here with his baby twins, is one of a growing number of stay-at-home dads. Cranford says the experience has made him appreciate how difficult the work can be: “Sometimes at work you can just unplug, but with this you’ve got to be going all the time.”

Attachment Styles and Later Relationships

Developmental psychologist Erik Erikson (1902–1994), working with his wife, Joan Erikson (1902–1997), believed that securely attached children approach life with a sense of **basic trust**—a sense that the world is predictable and reliable. He attributed basic trust not to environment or inborn temperament, but to early parenting. He theorized that infants blessed with sensitive, loving caregivers form a lifelong attitude of trust rather than fear. (Later, we’ll consider Erikson’s other stages of development.)

basic trust

according to Erik Erikson, a sense that the world is predictable and trustworthy; said to be formed during infancy by appropriate experiences with responsive caregivers.

Many researchers now believe that our early attachments form the foundation for our adult relationships and our comfort with affection and intimacy (Birnbaum et al., 2006; Fraley et al., 2013). People who report secure relationships with their parents tend to enjoy secure friendships (Gorrese & Ruggieri, 2012). Students leaving home to attend college or university—another kind of "strange situation"—tend to adjust well if closely attached to parents (Mattanah et al., 2011). Children with sensitive, responsive mothers tend to flourish socially and academically (Raby et al., 2014).

Feeling insecurely attached to others may take one of two main forms (Fraley et al., 2011). One is *anxious attachment*, in which people constantly crave acceptance but remain vigilant to signs of possible rejection. (Being sensitive to threat, anxiously attached people also tend to be skilled lie detectors and poker players [Ein-Dor & Perry, 2012, 2013].) The other is *avoidant attachment*, in which people experience discomfort getting close to others and use avoidant strategies to maintain distance from others. In romantic relationships, an anxious attachment style creates constant concern over rejection, leading people to cling to their partners. An avoidant style decreases commitment and increases conflict (DeWall et al., 2011; Overall et al., 2015).

> “*Out of the conflict between trust and mistrust, the infant develops hope, which is the earliest form of what gradually becomes faith in adults.*”
>
> *Erik Erikson (1983)*

Adult attachment styles can also affect relationships with one's own children. But say this for those (nearly half of all people) who exhibit wary, insecure attachments: Anxious or avoidant people have helped our groups detect threat and escape dangers (Ein-Dor et al., 2010).

Deprivation of Attachment

Michael Carroll

The deprivation of attachment In this 1980s Romanian orphanage (during the autocratic rule of Nicolae Ceauşescu), the 250 children between ages one and five outnumbered caregivers 15 to 1.

48-3 How does childhood neglect or abuse affect children's attachments?

If secure attachment nurtures social competence, what happens when circumstances prevent a child's forming any attachments? In all of psychology, there is no sadder research literature. Babies locked away at home under conditions of abuse or extreme neglect are often withdrawn, frightened, even speechless. The same is true of those raised in institutions without the stimulation and attention of a regular caregiver, as was tragically illustrated during the 1970s and 1980s in Romania. Having decided that economic growth for his impoverished country required more human capital, Nicolae Ceaus¸escu, Romania's Communist dictator, outlawed contraception, forbade abortion, and taxed families with fewer than five children. The birthrate skyrocketed. But unable to afford the children they had been coerced into having, many families had to leave them at government-run orphanages with untrained and overworked staff. Child-to-caregiver ratios often were 15 to 1, so the children were deprived of healthy attachments with at least one adult.

When tested after Ceaus¸escu's 1989 execution, these socially deprived children had lower intelligence scores, reduced brain development, abnormal stress responses, and quadruple the rate of attention-deficit/hyperactivity disorder (ADHD) found in children assigned to quality foster care settings (Bick et al., 2015; Kennedy et al., 2016; McLaughlin et al., 2015; Nelson et al., 2014). Dozens of other studies across 19 countries have confirmed that orphaned children tend to fare better on later intelligence tests if raised in family homes. This is especially so for those placed at an early age (van IJzendoorn et al., 2008).

Most children growing up under adversity (such as the surviving children of the Holocaust and victims of childhood sexual abuse) are *resilient;* they withstand the trauma and become well-adjusted adults (Clancy, 2010; Helmreich, 1992; Masten, 2001). And hardship short of trauma often boosts mental toughness (Seery, 2011). Moreover, while enduring the hardship of growing up poor puts children at risk for some social pathologies, growing up rich puts them at risk for other problems. Affluent children are at elevated risk for substance abuse, eating disorders, anxiety, and depression (Lund & Dearing, 2012; Luthar et al., 2013). So when you face adversity, consider the possible silver lining. Your coping may strengthen your resilience—your tendency to bounce back and go on to lead a better life.

But many who experience enduring abuse don’t bounce back so readily. The Harlows’ monkeys raised in total isolation, without even an artificial mother, bore lifelong scars. As adults, when placed with other monkeys their age, they either cowered in fright or lashed out in aggression. When they reached sexual maturity, most were incapable of mating. If artificially impregnated, females often were neglectful, abusive, even murderous toward their first-born. Another primate experiment confirmed the abuse-breeds-abuse phenomenon: 9 of 16 female monkeys who had been abused by their mothers became abusive parents, as did *no* female raised by a nonabusive mother (Maestripieri, 2005).

> “*What is learned in the cradle, lasts to the grave.*”
>
> *French proverb*

In humans, too, the unloved may become the unloving. Most abusive parents—and many condemned murderers—have reported being neglected or battered as children (Kempe & Kempe, 1978; Lewis et al., 1988). Some 30 percent of people who have been abused later abuse their children—a rate lower than that found in the primate study, but four times the U.S. national rate of child abuse (Dumont et al., 2007; Kaufman & Zigler, 1987).

Although most abused children do *not* later become violent criminals or abusive parents, extreme early trauma may nevertheless leave footprints on the brain (Romens et al., 2015; Teicher & Samson, 2016). Like battle-stressed soldiers, abused children's brains respond to angry faces with heightened activity in threat-detecting areas (McCrory et al., 2011). In conflict-plagued homes, even sleeping infants' brains show heightened reactivity to hearing angry speech (Graham et al., 2013). As adults, these children exhibit stronger startle responses (Jovanovic et al., 2009). If repeatedly threatened and attacked while young, normally placid golden hamsters grow up to be cowards when caged with same-sized hamsters, or bullies when caged with weaker ones (Ferris, 1996). Such animals show changes in the brain chemical serotonin, which calms aggressive impulses. A similarly sluggish serotonin response has been found in abused children who become aggressive teens and adults. By sensitizing the stress response system, early stress can permanently heighten reactions to later stress and increase stress-related disease (Fagundes & Way, 2014; van Zuiden et al., 2012; Wei et al., 2012). Child abuse, as we noted in Unit III, can also leave epigenetic marks—chemical tags—that can alter normal gene expression.

> “*Stress can set off a ripple of hormonal changes that permanently wire a child's brain to cope with a malevolent world.*”
>
> *Abuse researcher Martin Teicher (2002)*

Such findings help explain why young children who have survived severe or prolonged physical abuse, childhood sexual abuse, bullying, or wartime atrocities are at increased risk for health problems, psychological disorders, substance abuse, and criminality (Lereya et al., 2015; Trickett et al., 2011; Whitelock et al., 2013; Wolke et al., 2013). In one national study of 43,093 adults, 8 percent reported experiencing physical abuse at least fairly often before age 18 (Sugaya et al., 2012). Among these, 84 percent had experienced at least one psychiatric disorder. Moreover, the greater the abuse, the greater the odds of anxiety, depression, substance use disorder, and attempted suicide. Abuse victims are at considerable risk for depression *if* they carry a gene variation that spurs stress-hormone production (Bradley et al., 2008). As we will see again and again, behavior and emotion arise from a particular environment interacting with particular genes.

Adults also suffer when attachment bonds are severed. Whether through death or separation, a break produces a predictable sequence. Agitated preoccupation with the lost partner is followed by deep sadness and, eventually, the beginnings of emotional detachment and a return to normal living (Hazan & Shaver, 1994). Newly separated couples who have long ago ceased feeling affection are sometimes surprised at their desire to be near the former partner. Detaching is a process, not an event.

Developing a Self-Concept

48-4 How do children’s self-concepts develop?

Infancy’s major social achievement is attachment. *Childhood’s* major social achievement is a positive sense of self. By the end of childhood, at about age 12, most children have developed a **self-concept**—an understanding and assessment of who they are. (Their *self-esteem* is how they *feel* about who they are.) Parents often wonder when and how this sense of self develops. “Is my baby girl aware of herself—does she know she is a person distinct from everyone else?”

self-concept

all our thoughts and feelings about ourselves in answer to the question, “Who am I?”

Of course we cannot ask the baby directly, but we can again capitalize on what she can do—letting her *behavior* provide clues to the beginnings of her self-awareness. In 1877, biologist Charles Darwin offered one idea: Self-awareness begins when we recognize ourselves in a mirror. To see whether a child recognizes that the girl in the mirror is indeed herself, researchers sneakily dabbed color on her nose. At about 6 months, children reach out to touch their mirror image as if it were another child (Courage & Howe, 2002; Damon & Hart, 1982, 1988, 1992). By 15 to 18 months, they begin to touch their own noses when they see the colored spot in the mirror (Butterworth, 1992; Gallup & Suarez, 1986). Apparently, 18-month-olds have a schema of how their face should look, and they wonder, “What is that spot doing on *my* face?”

Kate Nurre

Self-awareness Mirror images fascinate infants from the age of about 6 months. Only at about 18 months, however, does the child recognize that the image in the mirror is “me.”

By school age, children’s self-concept has blossomed into more detailed descriptions that include their gender, group memberships, psychological traits, and similarities and differences compared with other children (Newman & Ruble, 1988; Stipek, 1992). They come to see themselves as good and skillful in some ways but not others. They form a concept of which traits, ideally, they would like to have. By age 8 or 10, their self-image is quite stable.

Children’s views of themselves affect their actions. Children who form a positive self-concept are more confident, independent, optimistic, assertive, and sociable (Maccoby, 1980). So how can parents encourage a positive yet realistic self-concept?

Parenting Styles

48-5 What are the four main parenting styles?

Some parents spank, others reason. Some are strict, others are lax. Some show little affection, others liberally hug and kiss. How do parenting-style differences affect children?

The most heavily researched aspect of parenting has been how, and to what extent, parents seek to control their children. Parenting styles can be described as a combination of two traits: how *responsive* and how *demanding* parents are (Kakinami et al., 2015). Investigators have identified four parenting styles (Baumrind, 1966, 1967; Steinberg, 2001):

1. ***Authoritarian*** parents are *coercive*. They impose rules and expect obedience: “Don’t interrupt.” “Keep your room clean.” “Don’t stay out late or you’ll be grounded.” “Why? Because I said so.”
2. ***Permissive*** parents are *unrestraining*. They make few demands, set few limits, and use little punishment.
3. ***Negligent*** parents are *uninvolved*. They are neither demanding nor responsive. They are careless, inattentive, and do not seek to have a close relationship with their children.
4. ***Authoritative*** parents are *confrontive*. They are both demanding and responsive. They exert control by setting rules, but, especially with older children, they encourage open discussion and allow exceptions.

AP® EXAM TIP

It’s understandable if you are struggling to remember the differences between authoritarian and authoritative. Maybe it will help to realize that authoritative parents will engage in a little more give and take, while authoritarian parents do not negotiate. The words *give* and *authoritative* both end in the letters *ive*.

Too hard, too soft, too uncaring, and just right, these styles have been called, especially by pioneering researcher Diana Baumrind and her followers. For more on parenting styles and their associated outcomes, see Thinking Critically About: Parenting Styles.

Parents who struggle with conflicting advice should remember that *all advice reflects the advice-giver's values.* For parents who prize unquestioning obedience, or whose children live in dangerous environments, an authoritarian style may have the desired effect. For those who value children's sociability and self-reliance, authoritative firm-but-open parenting is advisable.

Flip It Video: Attachment Styles and Parenting

✓ Check Your Understanding

Ask Yourself

- How would you describe the style of your parents or primary caregivers? How has this impacted your attachment style or your other traits and behaviors?

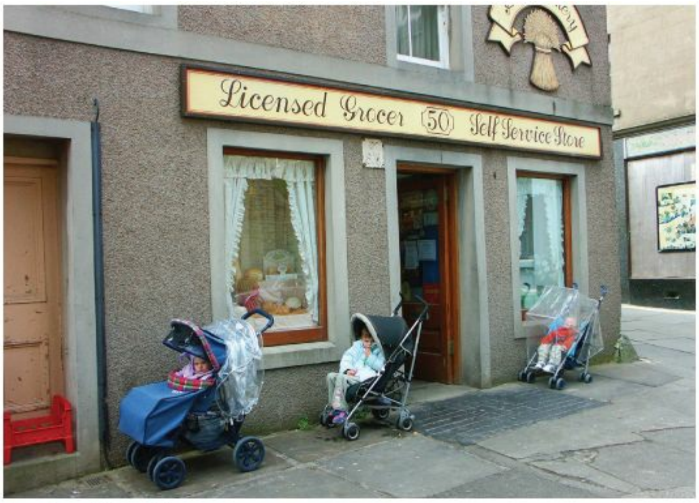
Test Yourself

- The four parenting styles may be described as "too hard, too soft, too uncaring, and just right." Which parenting style goes with each of these descriptions, and how do children benefit from the "just right" style?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Culture and Child Raising

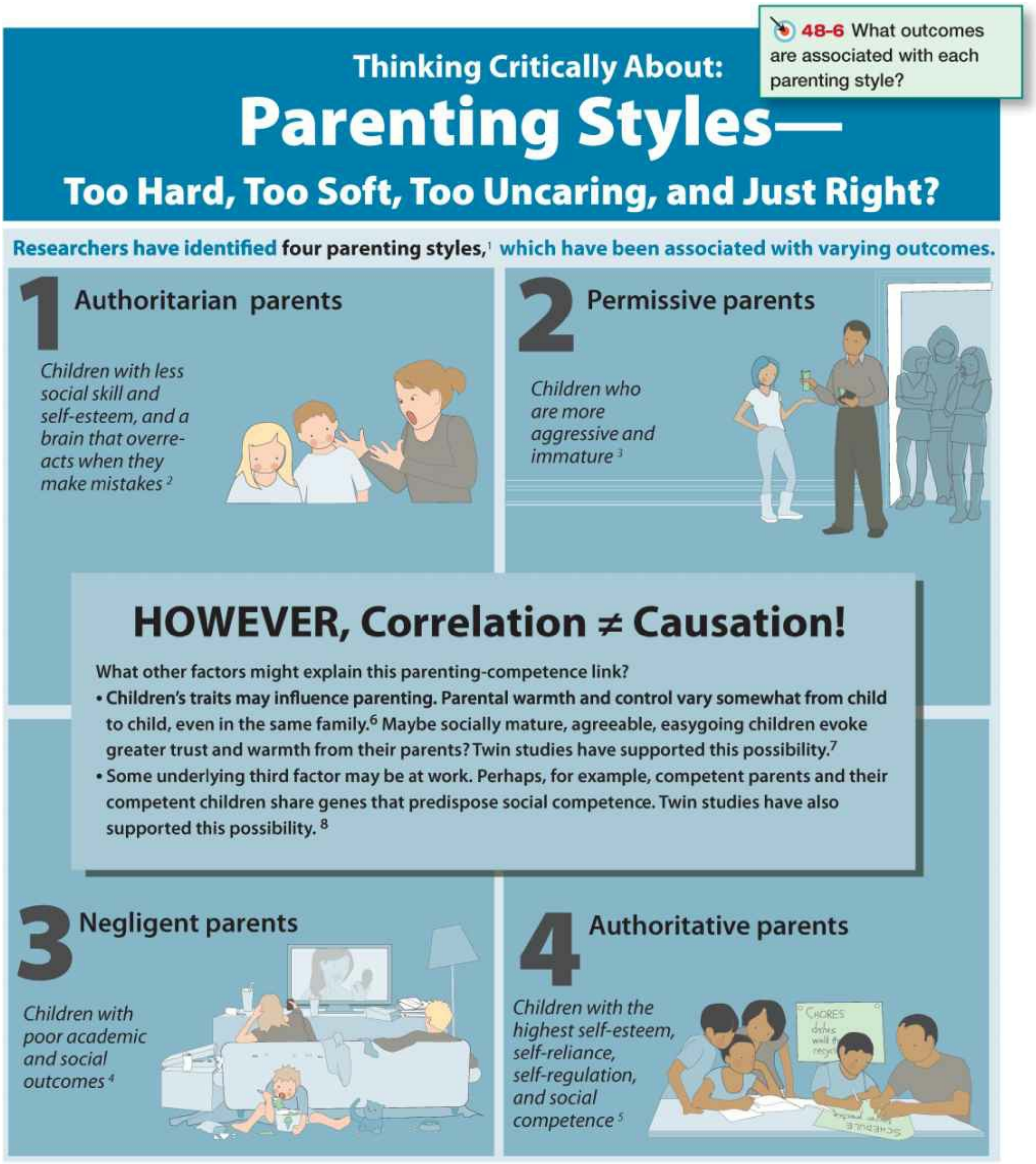
Child-raising practices reflect not only individual values, but also cultural values that vary across time and place. Should children be independent or obedient? If you live in a Westernized culture, you likely prefer independence. “You are responsible for yourself,” families and schools tell their children. “Follow your conscience. Be true to yourself. Discover your gifts.” Some Western parents go further, telling their children, “You are more special than other children” (Brummelman et al., 2015). (Not surprisingly, these children tend to have inflated self-views years later.) In the past, Western cultural values placed greater priority on obedience, respect, and sensitivity to others (Alwin, 1990; Remley, 1988). “Be true to your traditions,” parents then taught their children. “Be loyal to your heritage and country. Show respect toward your parents and other superiors.” Cultures schange.



Stephen H. Reehl

Cultures vary Parents everywhere care about their children, but raise and protect them differently depending on the surrounding culture. In big cities, parents keep children close. In smaller, close-knit communities, such as Scotland’s Orkney Islands’ town of Stromness, social trust has enabled parents to park their toddlers outside shops.

Children across place and time have thrived under various child-raising systems. Many North Americans now give children their own bedrooms and entrust them to day care. Upper-class British parents traditionally handed off routine caregiving to nannies, then sent their 10-year-olds away to boarding school. These children generally grew up to be pillars of British society.



48-6 What outcomes are associated with each parenting style?

Thinking Critically About:

Parenting Styles—

Too Hard, Too Soft, Too Uncaring, and Just Right?

Researchers have identified **four parenting styles,**[1] which have been associated with varying outcomes.

1 Authoritarian parents

Children with less social skill and self-esteem, and a brain that overreacts when they make mistakes[2]

2 Permissive parents

Children who are more aggressive and immature[3]

HOWEVER, Correlation ≠ Causation!

What other factors might explain this parenting-competence link?

- **Children's traits may influence parenting.** Parental warmth and control vary somewhat from child to child, even in the same family.[6] Maybe socially mature, agreeable, easygoing children evoke greater trust and warmth from their parents? Twin studies have supported this possibility.[7]
- **Some underlying third factor may be at work.** Perhaps, for example, competent parents and their competent children share genes that predispose social competence. Twin studies have also supported this possibility.[8]

3 Negligent parents

Children with poor academic and social outcomes[4]

4 Authoritative parents

Children with the highest self-esteem, self-reliance, self-regulation, and social competence[5]

1. Kakinami et al., 2015. 2. Meyer et al., 2015. 3. Luyckx et al., 2011. 4. Pinquart, 2015; Steinberg et al., 1994. 5. Baumrind, 1996, 2013; Buri et al.,1988; Coopersmith, 1967; Sulik et al., 2015. 6. Holden & Miller, 1999; Klahr & Burt, 2014. 7. Kendler, 1996. 8. South et al., 2008.

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Asians and Africans more often live in cultures that value emotional closeness. Infants and toddlers may sleep with their mothers and spend their days close to a family member (Morelli et al., 1992; Whiting & Edwards, 1988). These cultures encourage a strong sense of *family self*—a feeling that what shames the child shames the family, and what brings honor to the family brings honor to the self.

In traditional African Gusii society, babies nursed freely but spent most of the day on their mother's or siblings' back—with lots of body contact but little face-to-face and language interaction. In time, the toddler was weaned and handed over, often to an older sibling. What might appear as a lack of interaction to many Westerners might to these Gusii parents seem far preferable to the lesser body contact experienced by babies pushed in strollers and left in playpens (Small, 1997). Such diversity in child raising cautions us against presuming that our culture's way is the only way to raise children successfully.

***

The investment in raising a child buys many years of joy and love, but also of worry and irritation. Yet for most people who become parents, a child is one's legacy—one's personal investment in the human future. To paraphrase psychiatrist Carl Jung, we reach backward into our parents and forward into our children, and through their children into a future we will never see, but about which we must therefore care.

✓ Check Your Understanding

Ask Yourself

- How would you describe your own temperament? Is it similar to or different from that of other family members?

Test Yourself

- What distinguishes imprinting from attachment?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 48 REVIEW

48-1 How do parent-infant attachment bonds form?

- At about 8 months, soon after object permanence develops, children separated from their caregivers display *stranger anxiety*.
- Infants form *attachments* not simply because parents gratify biological needs but, more important, because they are comfortable, familiar, and responsive.
- Ducks and other animals have a more rigid attachment process, called *imprinting*, that occurs during a *critical period*.

48-2 How have psychologists studied attachment differences, and what have they learned?

- Attachment has been studied in *strange situation* experiments, which show that some children are *securely attached* and others are *insecurely attached*.
- Sensitive, responsive parents tend to have securely attached children.
- Adult relationships seem to reflect the attachment styles of early childhood, lending support to Erik Erikson's idea that *basic trust* is formed in infancy by our experiences with responsive caregivers.
- Yet it's become clear that *temperament*—our characteristic emotional reactivity and intensity—also plays a huge role in how our attachment patterns form.

48-3 How does childhood neglect or abuse affect children's attachments?

- Children are very resilient, but those who are moved repeatedly, severely neglected by their parents, or otherwise prevented from forming attachments by an early age may be at risk for attachment problems.

- Extreme trauma in childhood may alter the brain, affecting our stress responses or leaving epigenetic marks.

48-4 How do children’s self-concepts develop?

- *Self-concept*, an understanding and evaluation of who we are, emerges gradually.
- At 15 to 18 months, children recognize themselves in a mirror.
- By school age, they can describe many of their own traits, and by ages 8 to 10 their self-image is stable.

48-5 What are the four main parenting styles?

- The main parenting styles are *authoritarian* (coercive), *permissive* (unrestraining), *negligent* (uninvolved), and *authoritative* (confrontive).

48-6 What outcomes are associated with each parenting style?

- Authoritarian parenting is associated with lower self-esteem, less social skill, and a brain that overreacts to mistakes. Permissive parenting is associated with greater aggression and immaturity. Negligent parenting is associated with poor academic and social outcomes. Authoritative parenting is associated with greater self-esteem, self-reliance, self-regulation, and social competence.

Multiple-Choice Questions

1. An 18-month-old typically recognizes herself in a mirror. This self-awareness contributes to

a. self-assurance.
b. self-concept.
c. self-esteem.
d. self-actualization.

e. self-determination.

2. Studies done by Harry and Margaret Harlow found that

a. nutrition was the most important factor in attachment.
b. contact comfort was the most important factor in attachment.
c. the surrogate mother’s appearance was the most important attachment factor.
d. monkeys were equally likely to become attached to either surrogate mother.
e. the monkeys didn’t form attachments to the surrogate mothers.

3. What do we call an optimal window of opportunity for proper development?

a. Attachment
b. A critical period
c. A social period
d. Imprinting
e. A parenting style

4. Which of the following identifies the parenting style most likely to harshly punish a teen who has been accused of wrongdoing without first hearing from the teen?

a. Authoritative
b. Authoritarian
c. Permissive
d. Detached
e. Negligent

5. Which of the following would be considered a sign of secure attachment in a 1-year-old?

a. Showing no sign of stranger anxiety, whether the parent is present or not
b. Paying no attention to a parent who returns after a brief separation
c. Showing anger at the parent after a brief separation
d. Becoming distressed when the parent leaves and seeking contact on

return

e. Not reacting to a parent leaving or returning after a brief separation

6. According to research done by Erik Erikson and Joan Erikson, children who are securely attached are also likely to be

a. parented by authoritarian parents.
b. developing a sense of basic trust.
c. raised in a neglectful environment.
d. showing less stranger anxiety.
e. able to think in an abstract manner.

Practice FRQs

1. The Millers have 1-year-old fraternal twins who are generally calm and have a predictable schedule. However, they become very distressed when they are left at the day care each morning. Apply each of the following terms to the situation at the day care with the Miller twins:

- Secure attachment
- Temperament

Answer

1 point: The distress that the twins exhibit each day at day-care dropoff indicates that they are securely attached to their parents. They are upset that the parents have left them and will seek contact with them when they return. Page 511

1 point: Temperament refers to *a child's* level of emotional reactivity and intensity. The children appear to have an easy temperament, given their *predictable* schedule at home. Page 511

2. Keisha's parents could be described as permissive. Jasmine's parents could be described as authoritative. Describe the reactions of each set of parents when the girls ask if they can stay out past curfew.

(2 points)

Module **49 Gender Development**

LEARNING TARGETS

- 49-1 Discuss how the meaning of *gender* differs from the meaning of *sex.*
- 49-2 Describe some ways in which males and females tend to be alike and to differ.
- 49-3 Identify the factors that contribute to gender bias in the workplace.
- 49-4 Explain how gender roles and gender identity differ.

49-1 How does the meaning of *gender* differ from the meaning of *sex?*

As we saw in Module 34, we humans share an irresistible urge to organize our worlds into simple categories. Among the ways we classify people—as tall or short, dull or smart, cheerful or churlish—one stands out. Immediately after your birth (or before), everyone wanted to know, “Boy or girl?” Your parents may have offered clues with pink or blue clothing. Their answer described your **sex**, your biological status, defined by your chromosomes and anatomy. For most people, those biological traits help define their assigned **gender**, their culture’s expectations about what it means to be a boy, girl, man, or woman.

sex
in psychology, the biologically influenced characteristics by which people define *male* and *female*.

gender
in psychology, the socially influenced characteristics by which people define *boy, girl, man,* and *woman*.

Simply said, your body defines your sex. Your mind defines your gender. But your mind’s understanding of gender arises from the interplay between your biology and your experiences (Eagly & Wood, 2013). Before we consider that interplay in more detail, let’s take a closer look at some ways that males and females are both similar and different.

Similarities and Differences

49-2 What are some ways in which males and females tend to be alike and to differ?

Whether male or female, each of us receives 23 chromosomes from our mother and 23 from our father. Of those 46 chromosomes, 45 are *unisex* —the same for males and females. (In Module 53, we'll return to that forty-sixth chromosome.) Our similar biology helped our evolutionary ancestors face similar adaptive challenges. Both men and women needed to survive, reproduce, and avoid predators, and so today we are in most ways alike. Survival for both men and women involved traveling long distances, and in today's ultramarathons, men and women are similarly competitive. Identify yourself as male or female and you give no clues to your vocabulary, happiness, or ability to see, learn, and remember. Males and females, on average, have comparable creativity and intelligence and feel the same emotions and longings (Hyde, 2014). Our "opposite" sex is, in reality, our very similar sex.

FYI

Pink and blue baby outfits offer another example of how cultural norms vary and change. "The generally accepted rule is pink for the boy and blue for the girl," declared the publication *Earnshaw's Infants' Department* in June 1918 (Maglaty, 2011). "The reason is that pink being a more decided and stronger color is more suitable for the boy, while blue, which is more delicate and dainty, is prettier for the girls."

But in some areas, males and females do differ, and differences command attention. Some oft-noted differences (like the difference in self-esteem shown in **Figure 49.1**) are actually quite modest (Zell et al., 2015). Others are more striking. The average girl enters puberty about a year earlier than the average boy, and a woman's life span is 5 years longer.

She expresses emotions more freely, smiling and crying more, and, in Facebook updates, more often expresses “love” and being “sooo excited!!!” (Fischer & LaFrance, 2015; Schwartz et al., 2013). She can detect fainter odors, receives offers of help more often, and can become sexually re-aroused sooner after orgasm. She also has twice the risk of developing depression and anxiety and 10 times the risk of developing an eating disorder. Yet the average man is 4 times more likely to die by suicide or to develop an alcohol use disorder. His “more likely” list also includes autism spectrum disorder, color-deficient vision, and attention-deficit/hyperactivity disorder (ADHD). And as an adult, he is more at risk for antisocial personality disorder. Male or female, each has its own share of risks.

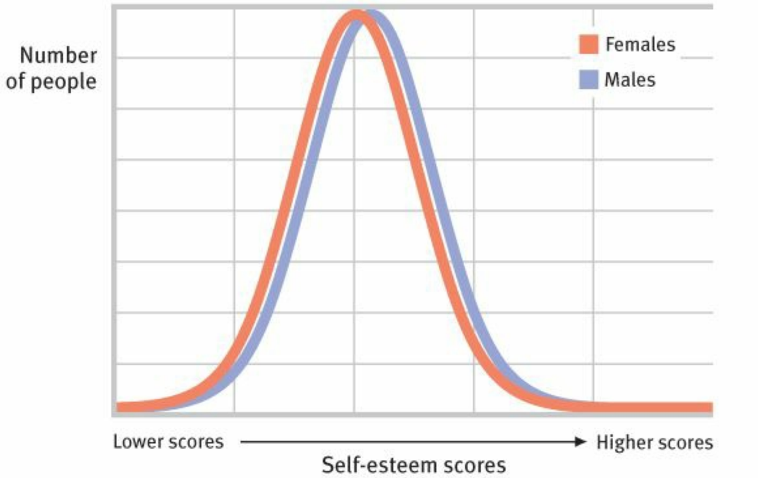

Figure 49.1
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Figure 49.1 Much ado about a small difference in self-esteem

These two normal distributions differ by the approximate magnitude (0.21 standard deviation) of the sex difference in self-esteem, averaged over all available samples (Hyde, 2005). Moreover, such comparisons illustrate differences between the average female and male. The variation among individual females or among individual males greatly exceeds this difference.

Gender similarities and differences appear throughout this book, but for now let’s take a closer look at three gender differences. Although individuals vary widely, the *average* male and female differ in aggression, social power, and social connectedness.

AP® EXAM TIP

There is a lot of information in this section. One good way to process these differences and similarities between genders is to consider which facts fit prevailing stereotypes and which don’t.

Aggression

To a psychologist, **aggression** is any physical or verbal behavior intended to hurt someone physically or emotionally. Think of examples of aggressive people. Are most of them men? Likely yes. Men generally admit to more aggression, especially extreme physical violence (Bushman & Huesmann, 2010; Wölfer & Hewstone, 2015). In romantic relationships between men and women, minor acts of physical aggression, such as slaps, are roughly equal, but the most violent acts are mostly committed by men (Archer, 2000; Johnson, 2008).

aggression

any physical or verbal behavior intended to harm someone physically or emotionally.

Laboratory experiments confirm a gender difference in aggression. Men have been more willing to blast people with what they believed was intense and prolonged noise (Bushman et al., 2007). And outside the laboratory, men—worldwide—commit more violent crime (Antonaccio et al., 2011; Caddick & Porter, 2012; Frisell et al., 2012). They also take the lead in hunting, fighting, warring, and supporting war (Liddle et al., 2012; Wood & Eagly, 2002, 2007).

Here’s another question: Think of examples of people harming others by passing along hurtful gossip, or by shutting someone out of a social group or situation. Were most of those people men? Perhaps not. Those behaviors are acts of **relational aggression**, and women are slightly more likely than men to commit them (Archer, 2004, 2007, 2009).

relational aggression

an act of aggression (physical or verbal) intended to harm a person's relationship or social standing.

Amy Sancetta/AP Images

Deadly relational aggression Sladjana Vidovic was a high school student who committed suicide after suffering constant relational aggression by bullies.

VLADIMIR FEDORENKO/AFP/Getty Images

Gender difference in aggression Around the world, fighting, violent crime, and blowing things up are mostly men's activities. This is why many were surprised to hear that female suicide bombers were responsible for the 2010 Moscow subway bombing that killed dozens.

Social Power

Imagine you’ve walked into a job interview and are taking your first look at the two interviewers. The unsmiling person on the left oozes self-confidence and independence, maintaining steady eye contact. The person on the right gives you a warm, welcoming smile, making less eye contact and seeming to expect the other interviewer to take the lead.

FYI

Women’s 2017 representation in national parliaments ranged from 18 percent in the Arab States to 42 percent in Scandinavia (IPU, 2017).

Which interviewer is male?

If you said the person on the left, you’re not alone. Around the world, from Nigeria to New Zealand, people have perceived gender differences in power (Williams & Best, 1990). For more on this topic, see Thinking Critically About: Gender Bias in the Workplace.

Social Connectedness

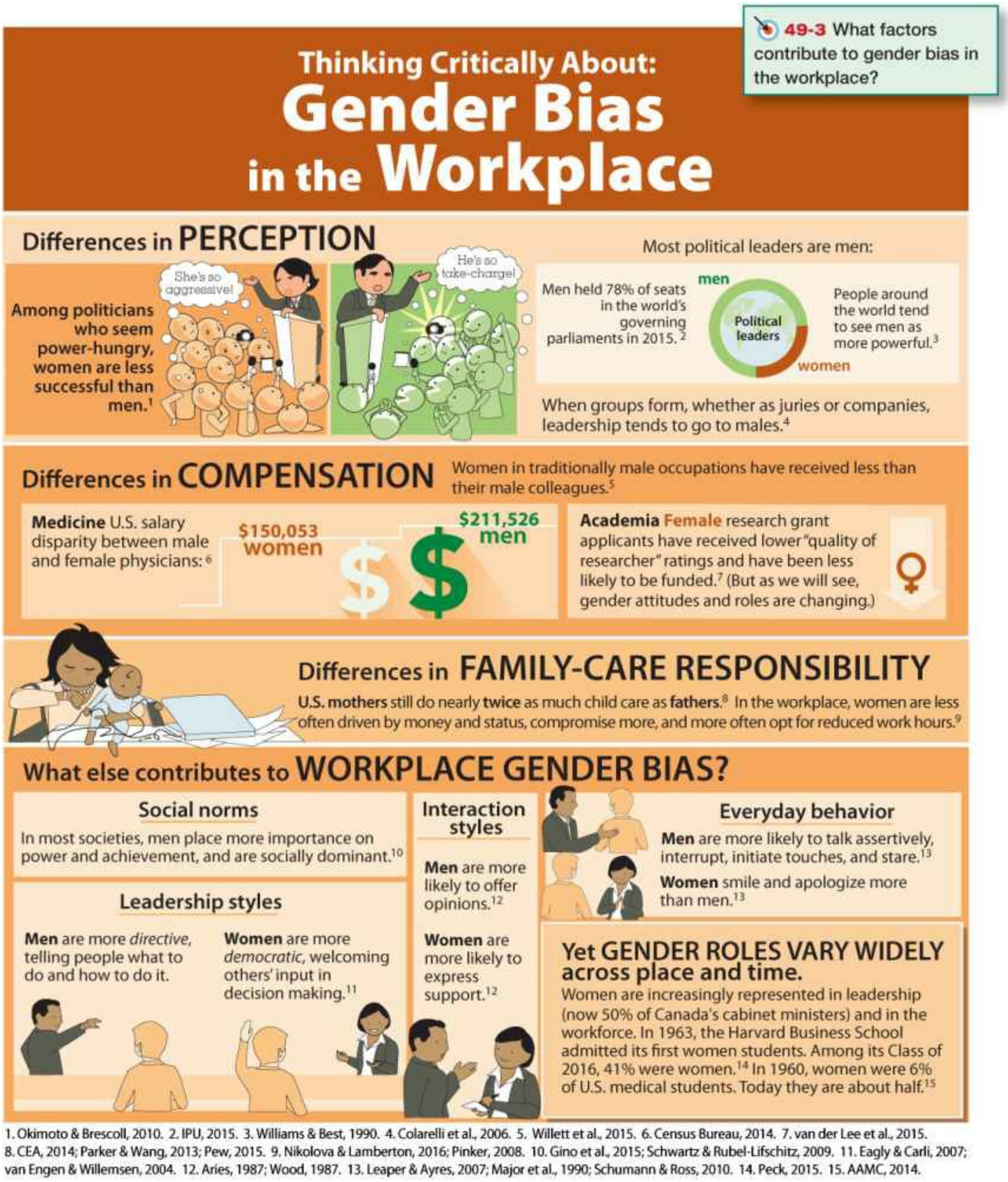
Whether male or female, we all have a need to belong, though we may satisfy this need in different ways (Baumeister, 2010). In the 1980s, many developmental psychologists believed that all children struggle to create a separate, independent identity. Research by Carol Gilligan and her colleagues (1982, 1990), however, suggested that this struggle describes Western individualist males more than relationship-oriented females. Gilligan believed females tend to differ from males both in being less concerned with viewing themselves as separate individuals and in being more concerned with “making connections.” Indeed, even as children, males typically form large play groups that brim with activity and competition, with little intimate discussion (Rose & Rudolph, 2006). As adults, men enjoy side-by-side activities, and their conversations often focus on problem solving (Tannen, 1990; Wright, 1989). When asked a difficult question—“Do you have any idea why the sky is blue?”—men are more likely than women to hazard answers than to admit they don’t know, a phenomenon researchers have called the *male answer syndrome* (Giuliano et al., 1998).

Scans of more than 1400 brains show no striking sex differences: “Human brains cannot be categorized into two distinct classes—male brain/female brain” (Joel et al., 2015). Brain scans do, however, suggest that a woman’s brain, more than a man’s, is wired in a way that enables social relationships (Ingalhalikar et al., 2013). This helps explain why females tend to be more *interdependent.* In childhood, girls usually play in small groups, often with one friend. They compete less and imitate social relationships more (Maccoby, 1990; Roberts, 1991). Teen girls spend more time with friends and less time alone (Wong & Csikszentmihalyi, 1991). In late adolescence, they spend more time on social networking sites and average twice as many text messages per day as boys (Lenhart, 2015; Pryor et al., 2007, 2011). Girls’ and women’s friendships are more intimate, with more conversation that explores relationships (Maccoby, 2002). In one analysis of 10 million Facebook posts, women’s status updates were as assertive as men’s, but used warmer words, while men more often swore or expressed anger (Park et al., 2016). An analysis of over 700 million Facebook words found women also used more family-related words, whereas men used more work-related words (Schwartz et al., 2013).

A gender difference in communication style was apparent in one New Zealand study of student e-mails. Two-thirds of the time people correctly guessed whether the author was male or female (Thomson & Murachver, 2001). In France, women have been found to make 63 percent of phone calls and, when talking to a woman, to stay connected longer (7.2 minutes) than men did when talking to other men (4.6 minutes) (Smoreda & Licoppe, 2000).

Do such findings mean that women are just more talkative? No. In another study, researchers counted the number of words 396 college students spoke in an average day (Mehl et al., 2007). Not surprisingly, the participants’ talkativeness varied enormously—by 45,000 words between the most and least talkative. (How many words would you guess you speak a day?) Contrary to stereotypes of wordy women, both men and women averaged about 16,000 words daily.

Spoken words may not peg women or men as more talkative, but they do open windows on our interests. More than a half-million people's responses to various interest inventories reveal that "men prefer working with things and women prefer working with people" (Su et al., 2009). On entering American colleges, men are seven times more likely than women to express interest in computer science (Pryor et al., 2011).



49-3 What factors contribute to gender bias in the workplace?

Thinking Critically About:

Gender Bias in the Workplace

Differences in **PERCEPTION**

Among politicians who seem power-hungry, women are less successful than men.[1]

Most political leaders are men:

Men held 78% of seats in the world's governing parliaments in 2015.[2]

People around the world tend to see men as more powerful.[3]

When groups form, whether as juries or companies, leadership tends to go to males.[4]

Differences in **COMPENSATION**

Women in traditionally male occupations have received less than their male colleagues.[5]

Medicine U.S. salary disparity between male and female physicians:[6]

Academia Female research grant applicants have received lower "quality of researcher" ratings and have been less likely to be funded.[7] (But as we will see, gender attitudes and roles are changing.)

Differences in **FAMILY-CARE RESPONSIBILITY**

U.S. mothers still do nearly **twice** as much child care as **fathers**.[8] In the workplace, women are less often driven by money and status, compromise more, and more often opt for reduced work hours.[9]

What else contributes to **WORKPLACE GENDER BIAS?**

Social norms

In most societies, men place more importance on power and achievement, and are socially dominant.[10]

Leadership styles

Men are more *directive*, telling people what to do and how to do it.

Women are more *democratic*, welcoming others' input in decision making.[11]

Interaction styles

Men are more likely to offer opinions.[12]

Women are more likely to express support.[12]

Everyday behavior

Men are more likely to talk assertively, interrupt, initiate touches, and stare.[13]

Women smile and apologize more than men.[13]

Yet GENDER ROLES VARY WIDELY across place and time.

Women are increasingly represented in leadership (now 50% of Canada's cabinet ministers) and in the workforce. In 1963, the Harvard Business School admitted its first women students. Among its Class of 2016, 41% were women.[14] In 1960, women were 6% of U.S. medical students. Today they are about half.[15]

1. Okimoto & Brescoll, 2010. 2. IPU, 2015. 3. Williams & Best, 1990. 4. Colarelli et al., 2006. 5. Willett et al., 2015. 6. Census Bureau, 2014. 7. van der Lee et al., 2015. 8. CEA, 2014; Parker & Wang, 2013; Pew, 2015. 9. Nikolova & Lamberton, 2016; Pinker, 2008. 10. Gino et al., 2015; Schwartz & Rubel-Lifschitz, 2009. 11. Eagly & Carli, 2007; van Engen & Willemsen, 2004. 12. Aries, 1987; Wood, 1987. 13. Leaper & Ayres, 2007; Major et al., 1990; Schumann & Ross, 2010. 14. Peck, 2015. 15. AAMC, 2014.

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When searching for understanding from someone who will share their worries and hurts, people usually turn to women. Both men and women have reported that their friendships with women are more intimate, enjoyable, and nurturing (Kuttler et al., 1999; Rubin, 1985; Sapadin, 1988). Bonds and feelings of support are stronger among women than among men (Rossi & Rossi, 1993). Women’s ties—as mothers, daughters, sisters, aunts, and grandmothers—bind families together. As friends, women talk more often and more openly (Berndt, 1992; Dindia & Allen, 1992). And how do they cope with stress? Compared with men, women are more likely to turn to others for support. They are said to *tend and befriend* (Tamres et al., 2002; Taylor, 2002).

Anthony Asael/Danita Delimont Stock Photography

© 2/Rob Van Petten/Ocean/Corbis

Every man for himself, or tend and befriend? Sex differences in the way we interact with others begin to appear at a very young age.

As empowered people generally do, men value freedom and self-reliance, which may help explain why men of all ages, worldwide, are less religious and pray less (Benson, 1992; Stark, 2002). Men also dominate the ranks of professional skeptics. All 10 winners and 14 runners-up on the *Skeptical Inquirer* list of outstanding twentieth-century rationalist skeptics were men. The Science and the Paranormal section of the 2010 Prometheus Books catalog (from the leading publisher of skepticism) included 98 male and 4 female authors. Women are far more likely to author books on spirituality.

Gender differences in both social connectedness and power are greatest in late adolescence and early adulthood—the prime years for dating and mating. By their teen years, girls become less assertive and more flirtatious, and boys appear more dominant and less expressive (Chaplin, 2015). In adulthood, after the birth of a first child, attitude and behavior differences often peak. Mothers especially may become more traditional (Ferriman et al., 2009; Katz-Wise et al., 2010). By age 50, most parenting-related gender differences subside. Men become less domineering and more empathic, and women—especially those with paid employment—become more assertive and self-confident (Kasen et al., 2006; Maccoby, 1998). Worldwide, fewer women than men work full-time for an employer (19 percent versus 33 percent), but they are similarly more satisfied with their lives when employed rather than unemployed (Ryan, 2016).

So, although women and men are more alike than different, there are some behavior differences between the average woman and man. Are such differences dictated by our biology? Shaped by our cultures and other experiences? Do we vary in the extent to which we are male or female? Read on.

✓ Check Your Understanding

Ask Yourself

- Think of two people you've known for a long time: one male, and one female. Have you observed differences in their behavior that might, based on what you've learned here, be attributable to their gender? Have these differences changed with age?

Test Yourself

- ___________ (Men/Women) are more likely to commit relational aggression, and ___________ (men/women) are more likely to commit physical aggression.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

The Nurture of Gender: Our Culture and Experiences

49-4 How do gender roles and gender identity differ?

For many people, biological sex and gender coexist in harmony. Biology draws the outline, and culture paints the details. The physical traits that define a newborn as male or female are the same worldwide. But the gender traits that define how men (or boys) and women (or girls) *should* act, interact, or feel about themselves differ across time and place (Zentner & Eagly, 2015).

Gender Roles

Cultures shape our behaviors by defining how we ought to behave in a particular social position, or **role**. We can see this shaping power in **gender roles**—the social expectations that guide our behavior as men or as women.

role

a set of expectations (norms) about a social position, defining how those in the position ought to behave.

gender role

a set of expected behaviors, attitudes, and traits for males or for females.

Smoothies
Strawberry
Raspberry
Pineapple
B. Smaller

New Yorker Collection, 2001, Barbara Smaller from cartoonbank.com.

"Sex brought us together, but gender drove us apart."

In just a thin slice of history, gender roles worldwide have undergone an extreme makeover. At the beginning of the twentieth century, only one country in the world—New Zealand—granted women the right to vote (Briscoe, 1997). By 2015, all countries granted that right. A century ago, American women could not vote in national elections, serve in the military, or divorce a husband without cause. And if a woman worked for pay, she would more likely have been a midwife or a seamstress than a surgeon or a college professor. Now, more U.S. women than men graduate from college, and nearly half the workforce is female (DOL, 2015). In the STEM fields (Science, Technology, Engineering, and Mathematics), men currently hold most faculty positions (Ceci et al., 2014; Sheltzer & Smith, 2014). But when researchers invited U.S. professors to recommend candidates for STEM positions, most said they preferred hiring the highly qualified women over the equally qualified men (Williams & Ceci, 2015). The modern economy has produced jobs that rely not on brute strength but on social intelligence, open communication, and the ability to sit still and focus (Rosin, 2010).

Dinodia/The Image Works

The gendered tsunami In Sri Lanka, Indonesia, and India, the gendered division of labor helps explain the excess of female deaths from the 2004 tsunami. In some villages, 80 percent of those killed were women, who were mostly at home while the men were more likely to be at sea fishing or doing outdoor chores (Oxfam, 2005).

Nomadic societies of food-gathering people have had little division of labor by sex. Boys and girls receive much the same upbringing. In agricultural societies, where women typically work in the nearby fields and men roam while herding livestock, cultures have shaped children to assume more distinct gender roles (Segall et al., 1990; Van Leeuwen, 1978).

FYI

In Module 30, we explored how children can learn by observing others—including the aggressive behavior *modeled in* Albert Bandura’s famous Bobo doll experiment.

Take a minute to check your own gender expectations. Would you agree that “When jobs are scarce, men should have more rights to a job”? In the United States, Britain, and Spain, barely over 12 percent of adults agree. In Nigeria, Pakistan, and India, about 80 percent of adults agree (Pew, 2010). We’re all human, but my, how our views differ. Northern European countries offer the greatest gender equity, Middle Eastern and North African countries the least (UN, 2015).

How Do We Learn Gender?

A *gender role* describes how others expect us to think, feel, and act. Our **gender identity** is our personal sense of being male, female, or, occasionally, some combination of the two. How do we develop that personal viewpoint?

gender identity

our sense of being male, female, or some combination of the two.

Social learning theory assumes that we acquire our identity in childhood, by observing and imitating others’ gender-linked behaviors and by being rewarded or punished for acting in certain ways. (“Tatiana, you’re such a good mommy to your dolls”; “Big boys don’t cry, Armand.”) But some critics think there’s more to gender identity than imitating parents and being repeatedly rewarded for certain responses. They point out that **gender typing**—taking on a traditional male or female role—varies from child to child (Tobin et al., 2010).

social learning theory
the theory that we learn social behavior by observing and imitating and by being rewarded or punished.

gender typing
the acquisition of a traditional masculine or feminine role.

Parents do help to transmit their culture's views on gender. In one analysis of 43 studies, parents with traditional gender views were more likely to have gender-typed children who shared their culture's expectations about how males and females should act (Tenenbaum & Leaper, 2002). When fathers share equally in housework, their daughters develop higher aspirations for work outside the home (Croft et al., 2014).

> “*We need to keep changing the attitude that raises our girls to be demure and our boys to be assertive, that criticizes our daughters for speaking out and our sons for shedding a tear.*”
>
> *U.S. President Barack Obama, 2016*

But no matter how much parents encourage or discourage traditional gender behavior, children may drift toward what feels right to them. Some organize themselves into “boy worlds” and “girl worlds,” each guided by their understanding of the rules. Others conform to these rules more flexibly. Still others seem to prefer **androgyny:** A blend of male and female roles feels right to them. Androgyny has benefits. As adults, androgynous people are more adaptable. They are more flexible in their actions and in their career choices (Bem, 1993). They tend to be more resilient and self-accepting, and they experience less depression (Lam & McBride-Chang, 2007; Mosher & Danoff-Burg, 2008; Ward, 2000).

androgyny

displaying both traditional masculine and feminine psychological characteristics.

Feelings matter, but so does how we think. Early in life, we all form *schemas*, or concepts that help us make sense of our world. Our *gender schemas* organize our experiences of male-female characteristics and help us think about our gender identity, about who we are (Bem, 1987, 1993; Martin et al., 2002).

Courtesy of David Myers

The social learning of gender Children observe and imitate parental models.

As young children, we were "gender detectives" (Martin & Ruble, 2004). Before our first birthday, we knew the difference between a male and female voice or face (Martin et al., 2002). After we turned 2, language forced us to label the world in terms of gender. English classifies people as *he* and *she*. Other languages classify objects as masculine ("*le* train") or feminine ("*la* table").

Once children grasp that two sorts of people exist—and that they are of one of these two sorts—they search for clues about gender. In every culture, people communicate their gender in many ways. Their *gender expression* drops hints not only in their language but also in their clothing, interests, and possessions. Having picked up such clues, 3-year-olds may divide the human world in half. They will then like their own kind better and seek them out for play. “Girls,” they may decide, are the ones who watch *My Little Pony* and have long hair. “Boys” watch *Transformers* and don’t wear dresses. Armed with their newly collected “proof,” they then adjust their behaviors to fit their concept of gender. These stereotypes are most rigid at about age 5 or 6. If the new neighbor is a girl, a 6-year-old boy may assume he cannot share her interests. For young children, gender looms large.

For a **transgender** person, gender identity differs from what’s typical for that person’s birth-designated sex (APA, 2010; Bockting, 2014). Even as 5- to 12-year-olds, transgender children typically view themselves in terms of their expressed gender rather than their birth-designated sex (Olson et al., 2015). From childhood onward, a person may feel like a male in a female body, or a female in a male body. Biologist Robert Sapolsky (2015) explains: “It’s not that [these] individuals think they are a different gender than they actually are. It’s that they [are] stuck with bodies that are a different gender from who they actually are.”

transgender

an umbrella term describing people whose gender identity or expression differs from that associated with their birth-designated sex.

In most countries, it’s not easy being transgender. In a national survey of lesbian, gay, bisexual, and transgender Americans, 71 percent saw “some” or “a lot” of social acceptance for gay men, and 85 percent said the same for lesbians. But only 18 percent saw similar acceptance for transgender people (Sandstrom, 2015), who number about 1.4 million in the United States (Flores et al., 2016). And that is the experience of transgender people—46 percent of whom, in a survey of 27,175 transgender Americans, reported being verbally harassed in the last year (James et al., 2016). The psychiatric profession no longer considers gender nonconformity as a mental disorder, and thus no longer labels transgender people as having a “gender identity disorder.” But some transgender people (not surprisingly, given the social disapproval) may experience profound distress and be diagnosed with *gender dysphoria*.

Transgender people may attempt to align their outward appearance and everyday lives with their internal gender identity. Brain scans reveal that those who seek medical sex-reassignment have some neural tracts that differ from those whose gender identity matches their birth-designated sex (Kranz et al., 2014; Van Kesteren et al., 1997). Note that *gender identity* is distinct from *sexual orientation* (the direction of one’s sexual attraction). Transgender people may be sexually attracted to people of the other gender, the same gender, both genders, or to no one at all.

Colin McPherson/Getty Images

“My father . . . is . . . a woman.” So said Mark Morris (2015) of his famous parent, the transgender Welsh writer Jan Morris. After gender reassignment surgery in 1973, Jan Morris was forced by law to divorce Mark’s mother. “They continued to live together in a remarkably strong marital bond,” until remarrying when same-sex marriages became legal in Britain.

✓ Check Your Understanding

Ask Yourself

- Do you consider yourself strongly gender typed or not strongly gender typed? What factors do you think have contributed to your feelings of masculinity or femininity?

Test Yourself

- What are gender roles, and what do their variations tell us about our human capacity for learning and adaptation?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 49 REVIEW

49-1 How does the meaning of *gender* differ from the meaning of *sex*?

- *Gender* refers to the socially and culturally constructed expectations about what it means to be a boy, girl, man, or woman.
- *Sex* refers to our biological status as male or female, defined by our chromosomes and anatomy.
- We might say that our body defines our sex, while our mind defines our gender.

49-2 What are some ways in which males and females tend to be alike and to differ?

- We are more alike than different, thanks to our similar genetic makeup—we see, learn, and remember similarly, with comparable creativity, intelligence, and emotions. Males and females do differ in height, age of onset of puberty, life expectancy, and vulnerability to certain disorders.
- Men admit to more *aggression* than women do, and they are more likely to be physically aggressive. Women's aggression is more likely to be *relational*.
- Women focus more on social connectedness; they are more interdependent, and they "tend and befriend."

49-3 What factors contribute to gender bias in the workplace?

- Differences in male-female perception, compensation, and family responsibility both influence and reflect workplace gender bias.
- In most societies, men have more social power, and their leadership style tends to be directive, whereas women's tends to be more democratic.

- In their everyday behaviors and interactions, men tend to act more assertive and opinionated; women tend to act more supportive and apologetic.

49-4 How do gender roles and gender identity differ?

- *Gender roles,* the behaviors a culture expects from its men and women, vary across place and time.
- *Social learning theory* proposes that we learn *gender identity*—our personal sense of being male, female, or some combination of the two—as we learn other things: through reinforcement, punishment, and observation.
- Critics argue that cognition also plays a role, as *gender typing* varies between children. We seem to conform in ways that feel comfortable to us, whether that means taking on a male role, female role, or blend of the two (*androgyny*).
- *Transgender* people's gender identity differs from the behaviors or traits considered typical for their biological sex. Their sexual orientation may be heterosexual, homosexual, bisexual, or asexual.

Multiple-Choice Questions

1. According to research, which of the following is more common among males than females?

a. Physical aggression
b. Smiling
c. Relational aggression
d. Averting one's eyes
e. Apologizing

2. Gender ______ are the social expectations that guide men and women's behavior. Gender ______ is a person's sense of being male or female.

a. concepts; role
b. preferences; role

c. roles; preference
d. roles; identity
e. roles; preference

3. Which of the following is generally true of males when compared to females?

a. They have a longer life span.
b. They are more likely to have a democratic leadership style.
c. They are more likely to commit suicide.
d. They are more likely to be diagnosed with depression.
e. They are more likely to be diagnosed with anxiety.

4. Diego likes to play sports and video games, whereas Sara likes to sing, dance, and play "house." This example best depicts which of the following?

a. Gender identity
b. Gender typing
c. Gender schema
d. Social learning theory
e. Gender expression

5. Carol Gilligan's research emphasizes prominent female characteristics, especially

a. spatial abilities.
b. making social connections.
c. playing in large groups.
d. talking a great deal.
e. playing in competitive groups.

Practice FRQs

1. Explain the difference between gender roles and gender schemas. How does social learning contribute to the formation of each?

Answer

1 point: Gender roles are the cultural norms for expected behaviors for males and females. Page 525

1 point: Gender schemas are the cognitive ways in which we organize boy-girl characteristics. Page 526

1 point: Social learning contributes to gender schema formation through the observation of gender roles and the rewarding of gender-appropriate behaviors. Pages 525–526

2. Give an example of a biological, a psychological, and a social factor that might contribute to gender differences.

(3 points)

Module **50 Parents, Peers, and Early Experiences**

LEARNING TARGETS

- 50-1 Describe how early experiences can modify the brain.
- 50-2 Discuss the ways in which parents and peers shape children's development.

Our genes, when expressed in specific environments, influence our developmental differences. We are like coloring books, with certain lines predisposed and experience filling in the full picture. We are formed by nature *and* nurture, but what are the most influential components of our nurture? How do our early experiences, our family and peer relationships, and all our other experiences guide our development and contribute to our diversity?

The formative nurture that conspires with nature begins at conception, with the prenatal environment in the womb, where embryos receive differing nutrition and varying levels of exposure to toxic agents. Nurture then continues outside the womb, where our early experiences foster brain development.

Experience and Brain Development

50-1 How do early experiences modify the brain?

Developing neural connections prepare our brain for thought, language, and other later experiences. So how do early experiences leave their fingerprints in the brain? Mark Rosenzweig, David Krech, and their colleagues (1962) opened a window on that process when they raised some young rats in solitary confinement and others in a communal playground. When they later analyzed the rats' brains, those who died with the most toys had won. The rats living in the enriched environment, which simulated a natural environment, usually developed a heavier and thicker brain cortex (**Figure 50.1**).

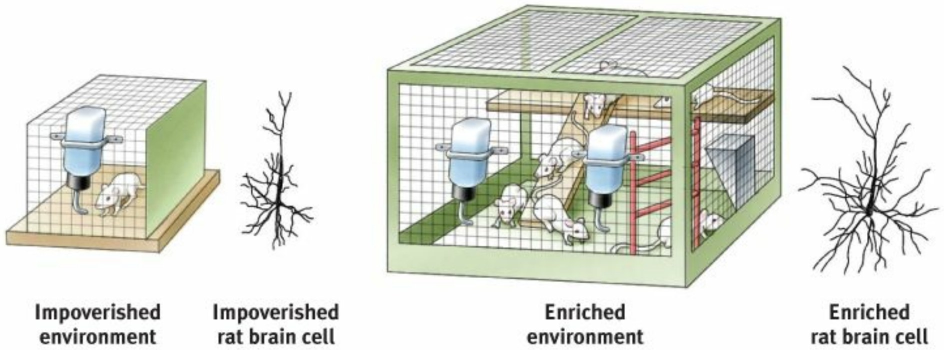

Figure 50.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 50.1 Experience affects brain development

Mark Rosenzweig, David Krech, and their colleagues (1962) raised rats either alone in an environment without playthings, or with other rats in an environment enriched with playthings that changed daily. In 14 of 16 repetitions of this basic experiment, rats in the enriched environment developed significantly more cerebral cortex (relative to the rest of the brain's tissue) than did those in the impoverished environment.

Rosenzweig was so surprised that he repeated the experiment several times before publishing his findings (Renner & Rosenzweig, 1987;

Rosenzweig, 1984). So great are the effects that, shown brief video clips of rats, you could tell from their activity and curiosity whether their environment had been impoverished or enriched (Renner & Renner, 1993). After 60 days in the enriched environment, the rats' brain weights increased 7 to 10 percent and the number of *synapses* mushroomed by about 20 percent (Kolb & Whishaw, 1998). The enriched environment literally increased brain power.

Courtesy of C. Brune

Stringing the circuits young String musicians who started playing before age 12 have larger and more complex neural circuits controlling the note-making left-hand fingers than do string musicians whose training started later (Elbert et al., 1995).

Such results have motivated improvements in environments for laboratory, farm, and zoo animals—and for children in institutions. Stimulation by touch or massage also benefits infant rats and premature babies (Field et al., 2007; Sarro et al., 2014). "Handled" infants of both species develop faster neurologically and gain weight more rapidly. Preemies who have had skin-to-skin contact with their mothers sleep better, experience less stress, and show better cognitive development 10 years later (Feldman et al., 2014).

Nature and nurture interact to sculpt our synapses. Brain maturation provides us with an abundance of neural connections. Experience—sights and smells, touches and tastes, music and movement—activates and strengthens some neural pathways while others weaken from disuse. Similar to paths through a forest, less-traveled neural pathways gradually disappear and popular ones are broadened (Gopnik et al., 2015). By puberty, this *pruning process* results in a massive loss of unemployed connections.

Here at the juncture of nurture and nature is the biological reality of early childhood learning. During early childhood—while excess connections are still on call—youngsters can most easily master such skills as the grammar and accent of another language. Lacking any exposure to language before adolescence, a person will never master any language (see Module 36). Likewise, lacking visual experience during the early years, a person whose vision is later restored by cataract removal will never achieve normal perceptions (see Module 19) (Gregory, 1978; Wiesel, 1982). Without that early visual stimulation, the brain cells normally assigned to vision will die or be diverted to other uses. The maturing brain's rule: Use it or lose it.

> “*Genes and experiences are just two ways of doing the same thing—wiring synapses.*”
>
> *Joseph LeDoux*, The Synaptic Self, *2002*

Although normal stimulation during the early years is critical, the brain's development does not end with childhood. As we saw in Modules 9 and 12, thanks to the brain's amazing *plasticity*, our neural tissue is ever changing and reorganizing in response to new experiences. New neurons are also born. If a monkey pushes a lever with the same finger many times a day, brain tissue controlling that finger will change to reflect the experience (**Figure 50.2**). Human brains work similarly. Whether learning to keyboard, skateboard, or navigate London's streets, we perform with increasing skill as our brain incorporates the learning (Ambrose, 2010; Maguire et al., 2000).

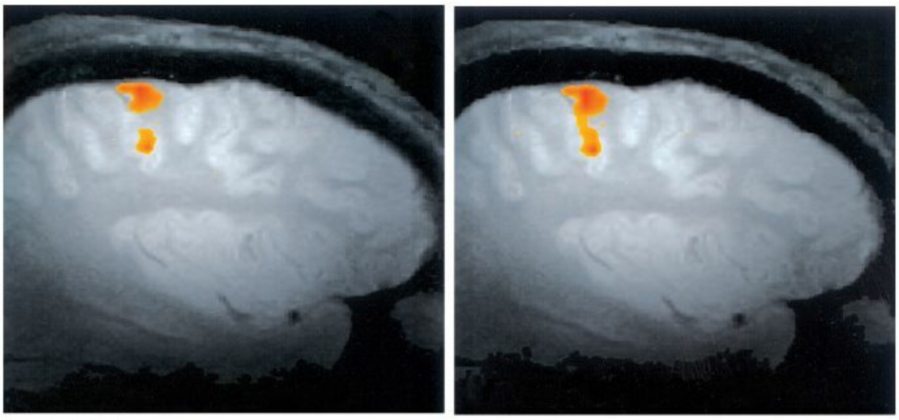

Figure 50.2
Courtesy of Avi Karni & Leslie Ungerleider, National Institute of Mental Health

Figure 50.2 A trained brain

A well-learned finger-tapping task activates more motor cortex neurons (orange area, right) than were active in this monkey's brain before training (left). (From Karni et al., 1998.)

How Much Credit or Blame Do Parents Deserve?

50-2 In what ways do parents and peers shape children’s development?

In procreation, a woman and a man shuffle their gene decks and deal a life-forming hand to their child-to-be, who is then subjected to countless influences beyond their control. Parents, nonetheless, feel enormous satisfaction in their children’s successes or guilt and shame over their failures. They beam over the child who wins trophies and titles. They wonder where they went wrong with the child who is repeatedly in trouble.

FYI

Even among chimpanzees, when one infant is hurt by another, the victim’s mother will seemingly blame—and attack—the offender’s mother (Goodall, 1968).

Freudian psychiatry and psychology encouraged such ideas by blaming problems from asthma to schizophrenia on “bad mothering.” Believing that parents shape their offspring as a potter molds clay, many people praise parents for their children’s virtues and blame them for their children’s vices, and for the psychological harm that toxic parents presumably inflict on their fragile children. No wonder having and raising children can seem so risky.

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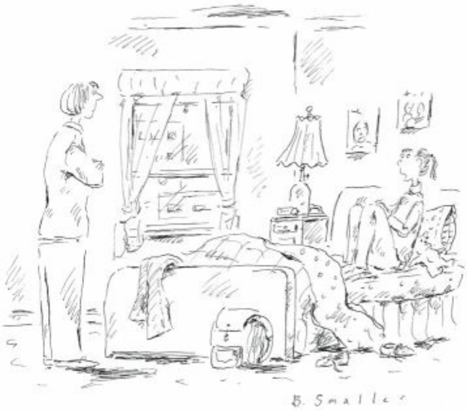
“To be frank, officer, my parents never set boundaries.”

But do parents really produce wounded future adults by being (take your pick from the toxic-parenting lists) overbearing—or uninvolved? Pushy—or indecisive? Overprotective—or distant? Should we then blame our parents for our failings, and ourselves for our children's failings? Or does talk of wounding fragile children through normal parental mistakes trivialize the brutality of real abuse?

Parents do matter. But parenting wields its largest effects at the extremes: the abused children who become abusive, the deeply loved but firmly handled who become self-confident and socially competent. The power of the family environment also appears in the remarkable academic and vocational successes of many children of people who leave their home countries, such as those of refugees who fled war-torn Vietnam and Cambodia—successes attributed to close-knit, supportive, even demanding families (Caplan et al., 1992). Asian-Americans and European-Americans often differ in their parenting expectations. An Asian-American mother may push her children to do well, but usually not in a way that strains their relationship (Fu & Markus, 2014). Having a supportive "Tiger Mother"—one who pushes her children and works alongside them—tends to motivate children to work harder. European-Americans, however, might see this as pushy parenting that undermines children's motivation (Deal, 2011).



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"So I blame you for everything—whose fault is that?"

Yet in personality measures, shared environmental influences from the womb onward typically account for less than 10 percent of children's differences. In the words of behavior geneticists Robert Plomin and Denise Daniels (1987; Plomin, 2011), “Two children in the same family are [apart from their shared genes] as different from one another as are pairs of children selected randomly from the population.” To developmental psychologist Sandra Scarr (1993), this implied that “parents should be given less credit for kids who turn out great and blamed less for kids who don’t.” So, knowing that children’s personalities are not easily sculpted by parental nurture, perhaps parents can relax and love their children for who they are.

Lorenzo Ciniglio/Polaris

A controlling mom Amy Chua, law professor and author of *Battle Hymn of the Tiger Mother* (2011), sparked controversy by comparing strict “Chinese” and more permissive “Western” parenting styles. In raising her two daughters, Chua came to appreciate the benefits and the costs of the more externally controlled traditional Chinese parenting.

Peer Influence

As children mature, what other experiences do the work of nurturing? At all ages, but especially during childhood and adolescence, we seek to fit in with our groups (Harris, 1998, 2000):

- Preschoolers who disdain a certain food often will eat that food if put at a table with a group of children who like it.
- Children who hear English spoken with one accent at home and another in the neighborhood and at school will invariably adopt the accent of their peers, not their parents. Accents (and slang) reflect culture, "and children get their culture from their peers," as Judith Rich Harris (2007) has noted.
- Teens who start smoking typically have friends who model smoking, suggest its pleasures, and offer cigarettes (Rose et al., 1999; Rose et al., 2003). Part of this peer similarity may result from a *selection effect*, as kids seek out peers with similar attitudes and interests. Those who smoke (or don't) may select as friends those who also smoke (or don't).

> “*Men resemble the times more than they resemble their fathers.*”
>
> *Ancient Arab proverb*

The power to select a child's neighborhood and schools gives some parents the ability to influence the culture that shapes the child's peer group. And because neighborhood influences matter, parents may want to become involved in intervention programs that aim at a whole school or neighborhood. If the vapors of a toxic climate are seeping into a child's life, that climate—not just the child—needs reforming. Even so, peers are but one medium of cultural influence. As an African proverb declares, "It takes a village to raise a child."

Allan Shoemake/Getty Images

Peer power As we develop, we play, date, and partner with peers. No wonder children and youths are so sensitive and responsive to peer influences.

✓ Check Your Understanding

Ask Yourself

- To what extent, and in what ways, have your peers and your parents helped shape who you are?

Test Yourself

- To predict whether a teenager smokes, ask how many of the teen's friends smoke. One explanation for this correlation is peer influence. What's another?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 50 REVIEW

50-1 How do early experiences modify the brain?

- As a child's brain develops, neural connections grow more numerous and complex. Experiences then trigger a pruning process, in which unused connections weaken and heavily used ones strengthen.
- Early childhood is an important period for shaping the brain, but thanks to plasticity, the brain modifies itself throughout our lives in response to our learning.

50-2 In what ways do parents and peers shape children's development?

- Family environment and parental expectations can affect children's motivation and future success. Personality, however, is mostly not attributable to the effects of nurture.
- As children attempt to fit in with their peers, they tend to adopt their culture—habits, accents, and slang, for example.
- By choosing their children's neighborhoods and schools, parents exert some influence over peer group culture.

Multiple-Choice Questions

1. Peer influence would have the strongest effect on

a. JS, who, at age 30, is deciding whether to propose to his girlfriend.
b. Frank, who, at age 10, is deciding whether to play baseball or hockey.
c. Arman, who, at age 18, is choosing between two highly rated colleges.
d. Linda, who, at age 45, is deciding which church group to join.
e. Johann, who, at age 7, is choosing a project for art class.

2. Compared with rats raised in an enriched environment, which of the following is true of rats raised in isolation?

a. Their brain cortex is less developed.
b. Though neurologically similar, they fear other rats.
c. Their brains have more connections.
d. They have a thicker brain cortex.
e. The differences between the two groups are not statistically significant.

3. In which of the following examples would parents have the highest degree of influence?

a. In homes where children are severely neglected or abused
b. In determining a child's personality
c. When a child is trying to fit in at a new school
d. When a young child is learning the language spoken at a new school
e. When a young person develops schizophrenia

4. Neurologically, what is the function of pruning?

a. Pruning creates new connections between synapses through repeated experiences.
b. Pruning reduces the negative effects of teratogens by eliminating neural waste.
c. Pruning increases the weight of the brain through enriching experiences.
d. Pruning creates areas in the brain used in learning mathematics.
e. Pruning eliminates unused neural pathways.

Practice FRQs

1. Compare and contrast the influence parents and peers have on a child's development, giving one example for each.

Answer

2 points: Parents influence a child's (1) quality of life, (2) achievements, and (3) exposure to peer culture via the neighborhoods and schools they choose. ↩ Page 531

2 points: Peers influence a child’s (1) tastes and styles, (2) accents and slang, and (3) substance use. ↩ Page 531

2. Provide two examples of how children are influenced by their peers.

(2 points)

Module 51 Adolescence: Physical and Cognitive Development

LEARNING TARGETS

- 51-1 Define *adolescence*, and discuss how the physical changes during this period affect developing teens.
- 51-2 Describe adolescent cognitive and moral development according to Piaget, Kohlberg, and later researchers.

51-1 How is *adolescence* defined, and how do physical changes affect developing teens?

Many psychologists once believed that childhood sets our traits. Today's developmental psychologists see development as lifelong. As this *life-span perspective* emerged, psychologists began to look at how maturation and experience shape us not only in infancy and childhood, but also in adolescence and beyond. Your story is still being written. **Adolescence**—the years spent morphing from child to adult—starts with the physical beginnings of sexual maturity and ends with the social achievement of independent adult status (which means that in some cultures, where teens are self-supporting, adolescence hardly exists).

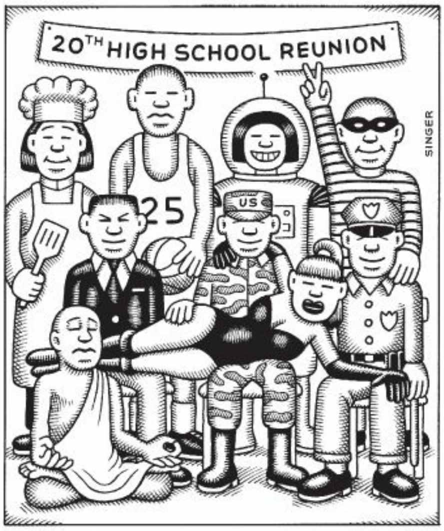
adolescence

the transition period from childhood to adulthood, extending from puberty to independence.

In industrialized countries, what are the teen years like? In Leo Tolstoy's *Anna Karenina*, the teen years were "that blissful time when childhood is just coming to an end, and out of that vast circle, happy and gay, a path takes shape." But another teenager, Anne Frank, writing in her diary while hiding from the Nazis, described tumultuous teen emotions:

> My treatment varies so much. One day Anne is so sensible and is allowed to know everything; and the next day I hear that Anne is just a silly little goat who doesn't know anything at all and imagines that she's learned a wonderful lot from books. . . . Oh, so many things bubble up inside me as I lie in bed, having to put up with people I'm fed up with, who always misinterpret my intentions.

G. Stanley Hall (1904), one of the first psychologists to describe adolescence, believed that this tension between biological maturity and social dependence creates a period of "storm and stress." It's a time when teens crave social acceptance but often feel socially disconnected. Three in four U.S. friendships started in seventh grade dissolve by the time adolescents complete eighth grade (Hartl et al., 2015). Indeed, after age 30, many who grow up in independence-fostering Western cultures look back on their teenage years as a time they would not want to relive—a time when their peers' social approval was imperative, their sense of direction in life was in flux, and their feeling of alienation from their parents was deepest (Arnett, 1999; Macfarlane, 1964).



Andy Singer

At a five-year high school reunion, former best friends may be surprised at their divergence; a decade or more later, they may have trouble sustaining a conversation.

But for many, adolescence is a time of vitality without the cares of adulthood, a time of rewarding friendships, heightened idealism, and a growing sense of life’s exciting possibilities.

Physical Development

Adolescence begins with **puberty**, the time when we mature sexually. Puberty follows a surge of hormones, which may intensify moods and which trigger the bodily changes discussed in Module 53.

puberty

the period of sexual maturation, during which a person becomes capable of reproducing.

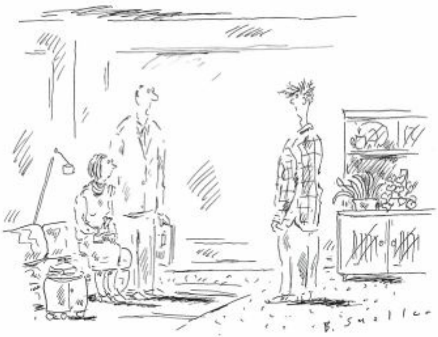
The Timing of Puberty Just as in the earlier life stages, the *sequence* of physical changes in puberty (for example, breast buds and visible pubic hair before *menarche*—the first menstrual period) is far more predictable than their *timing*. Some girls start their growth spurt at 9, some boys as late as age 16. How do girls and boys experience early maturation?

TRY THIS

How will you look back on your life 10 years from now? Are you making choices that someday you will recollect with satisfaction?

For boys, early maturation has mixed effects. Boys who are stronger and more athletic during their early teen years tend to be more popular, self-assured, and independent, though also more at risk for alcohol use, delinquency, and premature sexual activity (Conley & Rudolph, 2009; Copeland et al., 2010; Lynne et al., 2007). For girls, early maturation can be a challenge (Mendle et al., 2007). If a young girl's body and hormone-fed feelings are out of sync with her emotional maturity and her friends' physical development and experiences, she may begin associating with older adolescents, suffer teasing or sexual harassment, and experience increased rumination with anxiety or depression (Alloy et al., 2016; Ge & Natsuaki, 2009; Weingarden & Renshaw, 2012).

Girls in various countries are developing breasts and reaching puberty earlier today than in the past, a phenomenon variously attributed to increased body fat, increased hormone-mimicking chemicals in the diet, and increased stress related to family disruption (Biro et al., 2010, 2012; Ellis et al., 2012; Herman-Giddens, 2013). But the good news is that a secure child-mother attachment can provide a buffer against childhood stressors, including those of early puberty (Sung et al., 2016). Remember: *Nature and nurture interact.*



The New Yorker Collection 2006 by Barbara Smaller.
From cartoonbank.com

“Young man, go to your room and stay there until your cerebral cortex matures.”

The Teenage Brain An adolescent’s brain is still a work in progress. Until puberty, brain cells increase their connections, like trees growing more roots and branches. Then, during adolescence, comes a selective *pruning* of unused neurons and connections (Blakemore, 2008). What we don’t use, we lose. It’s rather like transportation engineers reducing congestion by moving traffic off side streets and onto more efficient highways.

As teens mature, their frontal lobes also continue to develop. The continuing growth of *myelin,* the fatty tissue that forms around axons and speeds neurotransmission, enables better communication with other brain regions (Whitaker et al., 2016). These developments bring improved judgment, impulse control, and long-term planning.

Frontal lobe maturation nevertheless lags behind that of the emotional limbic system. Puberty’s hormonal surge and limbic system development help explain teens’ occasional impulsiveness, risky behaviors, and emotional storms—slamming doors and turning up the music (Casey et al., 2008; Casey and Caudle, 2013; Fuhrmann et al., 2015). No wonder younger teens (whose unfinished frontal lobes aren’t yet fully equipped for making long-term plans and curbing impulses) may succumb to the tobacco corporations. Teens actually don’t underestimate the risks of smoking—or fast driving or unprotected sex. They just, when reasoning from their gut, weigh the benefits more heavily (Reyna & Farley, 2006; Steinberg, 2007, 2010). Teens find rewards more exciting than adults do. They seek thrills without a fully developed brake pedal controlling their impulses (**Figure 51.1**).

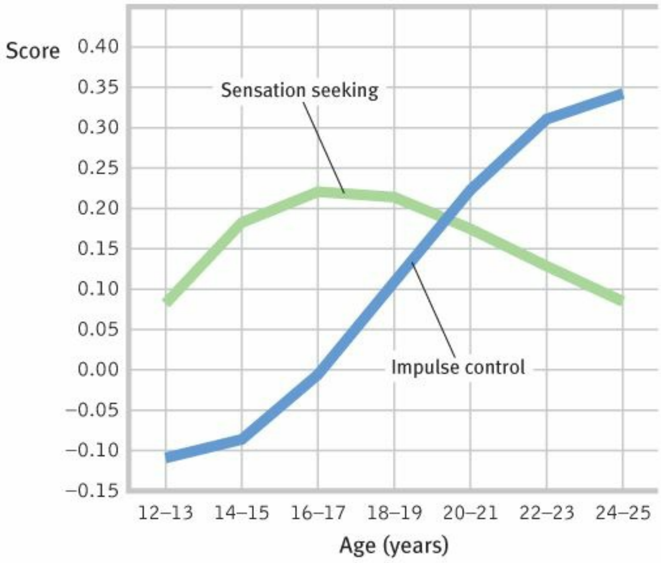


Figure 51.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 51.1 Impulse control lags reward seeking

Surveys of more than 7000 American 12- to 24-year-olds reveal that sensation seeking peaks in the mid-teens, with impulse control developing more slowly as frontal lobes mature (National Longitudinal Study of Youth and Children and Young Adults survey data presented by Steinberg, 2013).

So, when Junior drives recklessly and academically self-destructs, should his parents reassure themselves that “he can’t help it; his frontal cortex isn’t yet fully grown”? They can at least take hope: Brain changes underlie teens’ new self-consciousness about what others are thinking as well as their valuing of risky rewards (Barkley-Levenson & Galván, 2014; Somerville et al., 2013). And the brain with which Junior begins his teens differs from the brain with which he will end his teens. Unless he slows his brain development with heavy drinking—leaving him prone to impulsivity and addiction—his frontal lobes will continue maturing until about age 25 (Crews et al., 2007; Giedd, 2015). They will also become better connected with the limbic system, enabling better emotion regulation (Cohen, A. O. et al., 2016; Steinberg, 2012).

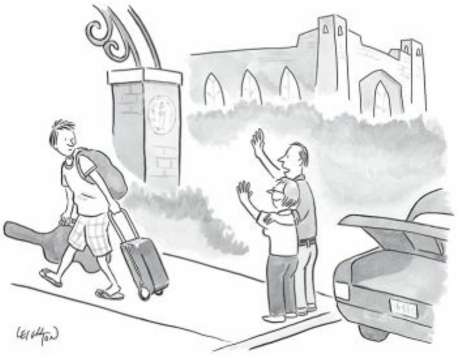
In 2004, the American Psychological Association (APA) joined seven other medical and mental health associations in filing U.S. Supreme Court briefs, arguing against the death penalty for 16- and 17-year-olds. The briefs documented the teen brain's immaturity "in areas that bear upon adolescent decision making." Brain scans of young teens reveal that frontal lobe immaturity is most evident among juvenile offenders and drug users (Shannon et al., 2011; Whelan et al., 2012). Thus, teens are "less guilty by reason of adolescence," suggested psychologist Laurence Steinberg and law professor Elizabeth Scott (2003; Steinberg et al., 2009). In 2005, by a 5-to-4 margin, the Court concurred, declaring juvenile death penalties unconstitutional. In 2012, the APA offered similar arguments against sentencing juveniles to life without parole (Banville, 2012; Steinberg, 2013). Once again, the Court, by a narrow 5-to-4 vote, concurred.

> *“I helped a so-called friend commit armed robbery and murder. . . . I was just 17 years old. . . . Been in prison for over 20 years . . . longer than I was ever free. . . . I am among the 300 plus “Juvenile Lifers” in Michigan prisons. I learned and matured a lot since my time incarcerated. I experience great remorse and regret over the tragedy that I ashamedly participated in. But I salvage this experience by learning and growing from it.”*
>
> *M. H., Michigan prison inmate, personal correspondence, 2015*

Cognitive Development

51-2 How did Piaget, Kohlberg, and later researchers describe adolescent cognitive and moral development?

During the early teen years, reasoning is often self-focused. Adolescents may think their private experiences are unique, something parents just could not understand: “But, Mom, *you* don’t really know how it feels to be in love” (Elkind, 1978). Capable of thinking about their own thinking, and about other people’s thinking, they also begin imagining what others are thinking about *them.* (They might worry less if they understood their peers’ similar self-absorption.) Gradually, though, most begin to reason more abstractly.



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“Be afraid to try new things!”

Developing Reasoning Power

When adolescents achieve the intellectual summit that Jean Piaget called *formal operations,* they apply their new abstract reasoning tools to the world around them. They may think about what is ideally possible and compare that with the imperfect reality of their society, their parents, and themselves. They may debate human nature, good and evil, truth and justice. Their sense of what’s fair changes from simple equality to equity—to what’s proportional to merit (Almås et al., 2010). Having left behind the concrete images of early childhood, they may search for spirituality and a deeper meaning of life (Boyatzis, 2012; Elkind, 1970). Reasoning hypothetically and deducing consequences also enables adolescents to detect inconsistencies and spot hypocrisy in others’ reasoning. This can lead to heated debates with parents and silent vows never to lose sight of their own ideals (Peterson et al., 1986).

> “*When the pilot told us to brace and grab our ankles, the first thing that went through my mind was that we must all look pretty stupid.*”
>
> *Jeremiah Rawlings, age 12, after surviving a 1989 plane crash in Sioux City, Iowa*

Developing Morality

Flip It Video: Adolescent Moral Development

Two crucial tasks of childhood and adolescence are discerning right from wrong and developing character—the psychological muscles for controlling impulses. Children learn to empathize with others, an ability that continues to develop in adolescence. To be a moral person is to *think* morally and *act* accordingly. Jean Piaget and Lawrence Kohlberg proposed that moral reasoning guides moral actions. A newer view builds on psychology’s game-changing recognition that much of our functioning occurs not on the “high road” of deliberate, conscious thinking but on the “low road,” unconscious and automatic.

100% Enforcement
No Guest Worker Amnesty
No Excuses
STRAND
we are the FUTURE of america

Left: RICHARD B. LEVINE/ Newscom; Right: Kevork Djansezian/Getty Images

Demonstrating their reasoning ability Although on opposite sides of the immigration policy debate, these teens are all demonstrating their ability to think logically about abstract topics. According to Piaget, they are in the final cognitive stage, formal operations.

Moral Reasoning

Piaget (1932) believed that children’s moral judgments build on their cognitive development. Agreeing with Piaget, Lawrence Kohlberg (1981, 1984) sought to describe the development of *moral reasoning*, the thinking that occurs as we consider right and wrong. Kohlberg posed moral dilemmas (for example, whether a person should steal medicine to save a loved one’s life) and asked children, adolescents, and adults whether the action was right or wrong. His analysis of their answers led him to propose three basic levels of moral thinking: preconventional, conventional, and postconventional (**Table 51.1**). Kohlberg claimed these levels form a moral ladder. As with all stage theories, the sequence is unvarying. We begin on the bottom rung and rise to varying heights, where we may place others’ comfort above our own (Crockett et al., 2014). Infants recognize right and wrong, preferring moral over immoral action (Cowell & Decety, 2015). Preschoolers, typically identifying with their cultural group, conform to and enforce its moral norms (Haun et al., 2014; Schmidt & Tomasello, 2012). When those norms reward kind actions, preschoolers help others (Carragan & Dweck, 2014). Kohlberg’s critics have noted that his postconventional stage is culturally limited, appearing mostly among people from large societies that prize individualism (Barrett et al., 2016; Eckensberger, 1994; Miller & Bersoff, 1995).

TABLE 51.1 Kohlberg’s Levels of Moral Thinking

Level (approximate age)	Focus	Example
Preconventional morality (before age 9)	Self-interest; obey rules to avoid punishment or gain concrete rewards.	“If you save your dying wife, you’ll be a hero.”
Conventional morality (early adolescence)	Uphold laws and rules to gain social approval or maintain social order.	“If you steal the drug for her, everyone will think you’re a criminal.”
Postconventional morality	Actions reflect belief in basic rights and self-defined ethical principles.	“People have a right to live.”

(adolescence and beyond)		

AP® EXAM TIP

Kohlberg’s is an important stage theory. It’s very important to understand that the stage you’re in doesn’t depend on *what* you decide to do (for example, steal the medicine), it depends on *why* you decide to do it.

Moral Intuition

Psychologist Jonathan Haidt [pronounced HITE] (2002, 2012) believes that much of our morality is rooted in *moral intuitions*—“quick gut feelings, or affectively laden intuitions.” According to this intuitionist view, the mind makes moral judgments in much the same way that it makes aesthetic judgments—quickly and automatically. Feelings of disgust or of elation trigger moral reasoning, says Haidt.

One woman recalled traveling through her snowy neighborhood with three young men as they passed “an elderly woman with a shovel in her driveway. . . . [O]ne of the guys . . . asked the driver to let him off there. . . . [M]y mouth dropped in shock as I realized that he was offering to shovel her walk for her.” Witnessing this unexpected goodness triggered elevation: “I felt like jumping out of the car and hugging this guy. I felt like singing and running, or skipping and laughing. I felt like saying nice things about people” (Haidt, 2000).

“Could human morality really be run by the moral emotions,” Haidt wonders, “while moral reasoning struts about pretending to be in control?” Consider the desire to punish. Laboratory games reveal that the desire to punish wrongdoing is mostly driven not by reason (such as an objective calculation that punishment deters crime) but rather by emotional reactions, such as moral outrage and the pleasure of revenge (Chester & DeWall, 2016; Darley, 2009). After the emotional fact, moral reasoning—our mind’s press secretary—aims to convince us and others of the logic of what we have intuitively felt.

Luke Sharrett/Bloomberg via Getty Images

Moral reasoning Some Houston, Texas, residents faced a moral dilemma in 2017 when Hurricane Harvey caused disastrous flooding. Should they risk their lives to try to rescue family, friends, and neighbors in dangerously flooded areas? Their reasoning likely reflected different levels of moral thinking, even if they behaved similarly.

This intuitionist perspective on morality finds support in a study of moral paradoxes. Imagine seeing a runaway trolley headed for five people. All will certainly be killed unless you throw a switch that diverts the trolley onto another track, where it will kill one person. Should you throw the switch? Most say *Yes.* Kill one, save five.

Now imagine the same dilemma, except that your opportunity to save the five requires you to push a large stranger onto the tracks, where he will die as his body stops the trolley. The logic is the same—kill one, save five?—but most say *No.* Seeking to understand why, researchers used brain imaging to spy on people's neural responses as they contemplated such dilemmas. Only the body-pushing type of moral dilemma activated the brain's emotion areas (Greene et al., 2001). Thus, our moral judgments provide another example of the two-track mind—of dual processing (Feinberg et al., 2012). Moral reasoning, centered in one brain area, says throw the switch. Our intuitive moral emotions, rooted in other brain areas, override reason when saying *don't* push the man. We may liken our moral cognition to our phone camera's settings. Usually, we rely on the default settings. Yet sometimes we use reason to manually override those settings and make adjustments (Greene, 2010).

Moral Action

Our moral thinking and feeling surely affect our moral talk. But sometimes talk is cheap and emotions are fleeting. Morality involves *doing* the right thing, and what we do also depends on social influences. As political theorist Hannah Arendt (1963) observed, many Nazi concentration camp guards during World War II were ordinary "moral" people who were corrupted by a powerfully evil situation.

The New Yorker Collection, 1987. From cartoonbank.com

Today's character education programs tend to focus on the whole moral package—thinking, feeling, and *doing* the right thing. In service-learning programs, teens have tutored, cleaned up their neighborhoods, and assisted older adults. The result? The teens' sense of competence and desire to serve has increased, their school absenteeism and dropout rates have dropped, and their violent behavior has diminished (Andersen, 1998; Heller, 2014; Piliavin, 2003). Moral action feeds moral attitudes.

> "*It is a delightful harmony when doing and saying go together.*"
>
> *Michel Eyquem de Montaigne (1533–1592)*

A big part of moral development is the self-discipline needed to restrain one's own impulses—to delay small gratifications now to enable bigger rewards later. One of psychology's best-known experiments was sparked by Walter Mischel's observations of his three preschool daughters' "remarkable progression" in self-control (2014). He gave Stanford nursery school 4-year-olds a choice between one marshmallow now, or two marshmallows when he returned a few minutes later. The children who had the willpower to delay gratification went on to have higher college completion rates and incomes, and less often suffered addiction problems. Moreover, when a sample of Mischel’s marshmallow alums were retested on a new willpower test 40 years later, their differences persisted (Casey et al., 2011).

Our capacity to *delay gratification*—to decline small rewards now for bigger rewards later—is basic to our future academic, vocational, and social success (Daly et al., 2015; Funder & Block, 1989; Sawyer et al., 2015). A preference for large-later rather than small-now rewards minimizes one’s risk of problem gambling, smoking, and delinquency (Callan et al., 2011; Ert et al., 2013; Lee et al., 2017). The moral of the story: Delaying gratification—living with one eye on the future—fosters flourishing.

✓ Check Your Understanding

Ask Yourself

- Can you recall making an impulsive decision when you were younger that you later regretted? Would you approach the situation differently today?

Test Yourself

- According to Kohlberg, _______________ morality focuses on self-interest, _______________ morality focuses on self-defined ethical principles, and _______________ morality focuses on upholding laws and social rules.
- How has Kohlberg’s theory of moral reasoning been criticized?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 51 REVIEW

51-1 How is *adolescence* defined, and how do physical changes affect developing teens?

- *Adolescence* is the transition period from childhood to adulthood, extending from puberty to social independence.
- For boys, early maturation has mixed effects; for girls, early maturation can be a challenge.
- The brain's frontal lobes mature and myelin growth increases during adolescence and the early twenties, enabling improved judgment, impulse control, and long-term planning.

51-2 How did Piaget, Kohlberg, and later researchers describe adolescent cognitive and moral development?

- Piaget theorized that adolescents develop a capacity for formal operations and that this development is the foundation for moral judgment.
- Lawrence Kohlberg proposed a stage theory of moral reasoning, from a preconventional morality of self-interest, to a conventional morality concerned with upholding laws and social rules, to (in some people) a postconventional morality of universal ethical principles.
- Other researchers believe that morality lies in moral intuition and moral action as well as thinking.
- Some critics argue that Kohlberg's postconventional level represents morality from the perspective of individualist cultures.

Multiple-Choice Questions

1. Walter Mischel's famous "marshmallow test" found that

a. adolescents are unable to control most impulses.

b. adults who can delay gratification often have lower paying jobs.
c. children who can delay gratification are often successful as adults.
d. children who can delay gratification often do not flourish as adults.
e. adolescents who can delay gratification tend to be at the preconventional level of morality.

2. ______ focused on moral intuition and how people feel about moral situations. _______, however, was more interested in moral reasoning and how people think about moral situations.

a. Kohlberg; Erikson
b. Erikson; Kohlberg
c. Piaget; Kohlberg
d. Piaget; Erikson
e. Haidt; Kohlberg

3. Howard cheats in his calculus class, even though he knows it is wrong, because “everyone else is doing it.” Kohlberg would argue that Howard’s response reflects a _______ view of morality.

a. myelinated
b. preconventional
c. conventional
d. postconventional
e. formal operational

4. What development in adolescents allows for greater impulse control?

a. The hormonal surge of early adolescence
b. Hindbrain changes associated with the onset of puberty
c. Frontal lobe maturation in late adolescence
d. Limbic system development in mid-adolescence
e. A decrease in myelin production throughout adolescence

5. Piaget would argue that as an adolescent, Mildred is better able to understand calculus because she is in the

a. sensorimotor stage.
b. preoperational stage.

c. concrete operational stage.
d. formal operational stage.
e. accommodation stage.

Practice FRQs

1. Even though they complain about how much they pay each year, the Singers dutifully pay their taxes. Provide an explanation Kohlberg might give for the reasoning behind the Singers' tax-paying behavior for each of his stages of moral thinking.

Answer

1 point: Preconventional morality: The Singers pay their taxes to avoid being punished with additional fines or jail time if they fail to pay. Pages 535–536

1 point: Conventional morality: The Singers pay their taxes simply because doing so is the rule. Pages 535–536

1 point: Postconventional morality: The Singers pay their taxes, even though they don't want to, because they feel it's the right thing to do to support government programs for people in need. Pages 535–536

2. Analyze how the following concepts might affect a middle school student who is asked by his friends to skip science class and hide in the bathroom at school.

- The timing of puberty
- The maturity of the teenage brain
- Conventional morality

(3 points)

Module **52 Adolescence: Social Development and Emerging Adulthood**

LEARNING TARGETS

- 52-1 Describe the social tasks and challenges of adolescence.
- 52-2 Contrast parental and peer influences during adolescence.
- 52-3 Discuss the characteristics of *emerging adulthood*.

52-1 What are the social tasks and challenges of adolescence?

Theorist Erik Erikson (1963) contended that each stage of life has its own *psychosocial* task, a crisis that needs resolution. Young children wrestle with issues of *trust*, then *autonomy* (independence), then *initiative*. School-age children strive for *competence*, feeling able and productive. But for people your age, the task is to synthesize past, present, and future possibilities into a clearer sense of self (**Table 52.1**). Adolescents wonder, “Who am I as an individual? What do I want to do with my life? What values should I live by? What do I believe in?” Erikson called this quest the adolescent’s *search for identity*.

TABLE 52.1 Erikson’s Stages of Psychosocial Development

Stage (approximate age)	Issue	Description of Task

Infancy (to 1 year)	Trust vs. mistrust	If needs are dependably met, infants develop a sense of basic trust.
Toddlerhood (1 to 3 years)	Autonomy vs. shame and doubt	Toddlers learn to exercise their will and do things for themselves, or they doubt their abilities.
Preschool (3 to 6 years)	Initiative vs. guilt	Preschoolers learn to initiate tasks and carry out plans, or they feel guilty about their efforts to be independent.
Elementary school (6 years to puberty)	Competence vs. inferiority	Children learn the pleasure of applying themselves to tasks, or they feel inferior.
Adolescence (teen years into 20s)	Identity vs. role confusion	Teenagers work at refining a sense of self by testing roles and then integrating them to form a single identity, or they become confused about who they are.
Young adulthood (20s to early 40s)	Intimacy vs. isolation	Young adults struggle to form close relationships and to gain the capacity for intimate love, or they feel socially isolated.
Middle adulthood (40s to 60s)	Generativity vs. stagnation	Middle-aged people discover a sense of contributing to the world, usually through family and work, or they may feel a lack of purpose.
Late adulthood (late 60s and up)	Integrity vs. despair	Reflecting on their lives, older adults may feel a sense of satisfaction or failure.

As sometimes happens in psychology, Erikson's interests were bred by his own life experience. As the son of a Jewish mother and a Danish Gentile father, Erikson was "doubly an outsider," reported Morton Hunt (1993, p. 391). He was "scorned as a Jew in school but mocked as a Gentile in the synagogue because of his blond hair and blue eyes." Such episodes fueled his interest in the adolescent struggle for identity.

AP® EXAM TIP

Become familiar with Table 52.1, Erikson’s Stages of Psychosocial Development, and be able to identify an individual that may be dealing with the issue in each stage. For example, a teenager may be dealing with the identity versus role confusion issue.

Forming an Identity

▶ Flip it Video: Adolescent Identity Development

To refine their sense of identity, adolescents in individualist cultures usually try out different "selves" in different situations. They may act out one self at home, another with friends, and still another at school or online. If two situations overlap—as when a teenager brings new friends home—the discomfort can be considerable (Klimstra et al., 2015). The teen often wonders, "Which self should I be? Which is the real me?" The eventual resolution is a self-definition that unifies the various selves into a consistent and comfortable sense of who one is—an **identity**.

identity

our sense of self; according to Erikson, the adolescent's task is to solidify a sense of self by testing and integrating various roles.

> “ *Somewhere between the ages of 10 and 13 (depending on how hormone-enhanced their beef was), children entered adolescence, a.k.a. 'the de-cutening'.* ”
>
> *Comedian Jon Stewart et al.,* Earth (The Book), *2010*

For both adolescents and adults, group identities are often formed by how we differ from those around us. When living in Britain, I [DM] become conscious of my Americanness. When spending time in Hong Kong, I [ND] become conscious of my minority White race. For international students, for those of a minority ethnic or religious group, for gay and transgender people, or for people with a disability, a **social identity** often forms around their distinctiveness.

social identity

the "we" aspect of our self-concept; the part of our answer to "Who am I?" that comes from our group memberships.

Erikson noticed that some adolescents forge their identity early, simply by adopting their parents' values and expectations. Other adolescents may adopt the identity of a particular peer group—jocks, preps, geeks, band kids, debaters. Traditional, collectivist cultures teach adolescents who they are, rather than encouraging them to decide on their own. Bicultural adolescents form complex identities as they integrate multiple group memberships and their feelings about them (Marks et al., 2011).

Most young people develop a sense of contentment with their lives. Which statement best describes you: "I would choose my life the way it is right now" or "I wish I were somebody else"? When American teens answered, 81 percent picked the first, and 19 percent the second (Lyons, 2004). Reflecting on their existence, 75 percent of American collegians say they "discuss religion/spirituality" with friends, "pray," and agree that "we are all spiritual beings" and "search for meaning/purpose in life" (Astin et al., 2004; Bryant & Astin, 2008). This would not surprise Stanford psychologist William Damon and his colleagues (2003), who have contended that a key task of adolescence is to achieve a purpose—a desire to accomplish something personally meaningful that makes a difference to the world beyond oneself.

Competence versus inferiority

Top: © Ron Chapple/Corbis; Bottom: © Oliver Rossi/Corbis

Intimacy versus isolation

Several studies indicate that self-esteem typically falls during the early to mid-teen years, and, for girls, depression scores often increase. But then self-image rebounds during the late teens and twenties, and previous gender differences in self-esteem become small (Zuckerman et al., 2016). Late adolescence is also a time when agreeableness and emotional stability scores increase (Klimstra et al., 2009).

Left: Tristan Savatier/Getty Images; Right: Juliana Wiklund/Getty Images

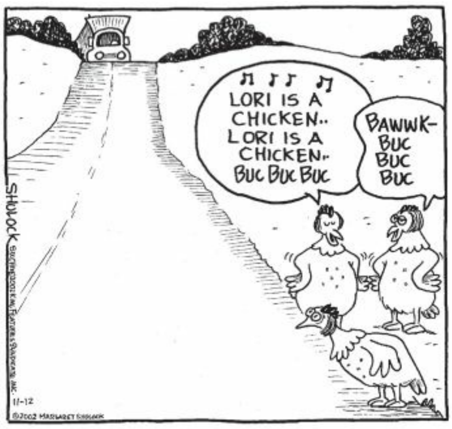
Who shall I be today? By varying the way they look, adolescents try out different "selves." Although we eventually form a consistent and stable sense of identity, the self we present may change with the situation.

These are the years when many people in industrialized countries begin exploring new opportunities by attending college or working full time. Many college seniors have achieved a clearer identity and a more positive self-concept than they had as first-year students (Waterman, 1988). Those students who have achieved a clear sense of identity are less prone to alcohol misuse (Bishop et al., 2005).

Erikson contended that adolescent identity formation (which continues into adulthood) is followed in young adulthood by a developing capacity for **intimacy,** the ability to form emotionally close relationships. When Mihaly Csikszentmihalyi [chick-SENT-me-hi] and Jeremy Hunter (2003) used a beeper to sample the daily experiences of American teens, they found them unhappiest when alone and happiest when with friends. Romantic relationships, which tend to be emotionally intense, are reported by some two in three North American 17-year-olds, but fewer in collectivist countries such as China (Collins et al., 2009; Li et al., 2010). Those who enjoy high-quality (intimate, supportive) relationships with family and friends tend also to enjoy similarly high-quality romantic relationships in adolescence, which set the stage for healthy adult relationships. Such relationships are, for most of us, a source of great pleasure. As Aristotle long ago recognized, we humans are “the social animal.” Relationships matter.

intimacy

in Erikson’s theory, the ability to form close, loving relationships; a primary developmental task in young adulthood.



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Parent and Peer Relationships

52-2 How do parents and peers influence adolescents?

This next research finding will not surprise you: As adolescents in Western cultures seek to form their own identities, they begin to pull away from their parents (Shanahan et al., 2007). The preschooler who can’t be close enough to her mother, who loves to touch and cling to her, becomes the 14-year-old who wouldn’t be caught dead holding hands with Mom. The transition occurs gradually (**Figure 52.1**). By adolescence, parent-child arguments occur more often, usually over mundane things—household chores, bedtime, homework (Tesser et al., 1989). Conflict during the transition to adolescence tends to be greater with first-born than with second-born children, and greater with mothers than with fathers (Burk et al., 2009; Shanahan et al., 2007).

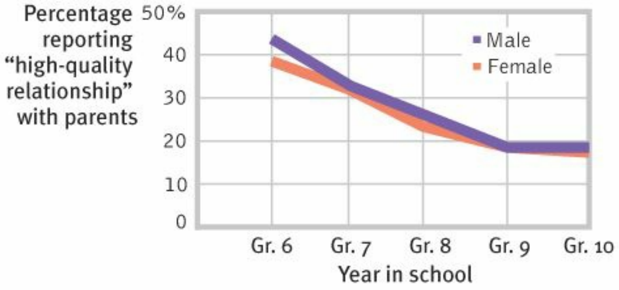
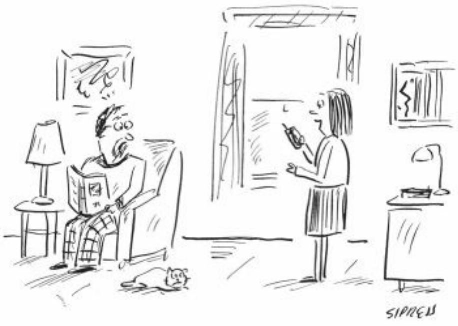


Figure 52.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 52.1 The changing parent-child relationship

In a large national study of Canadian families, the typically close, warm relationships between children and their parents loosened as they became teens (Pepler & Craig, 2012).



David Sipress

“She says she’s someone from your past who gave birth to you, and raised you, and sacrificed everything so you could have whatever you wanted.”

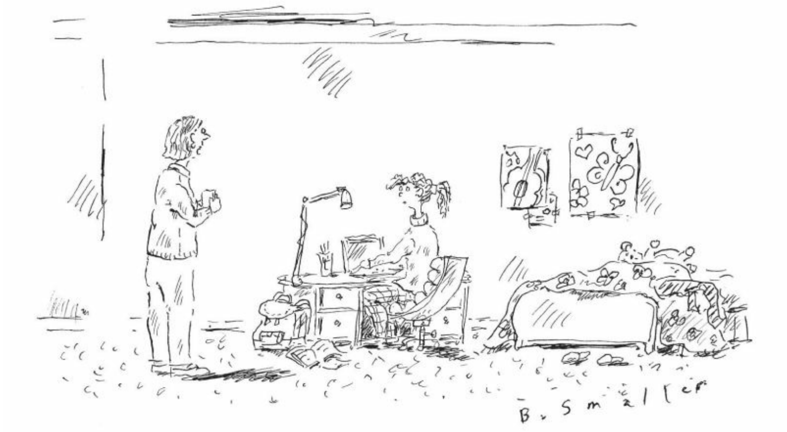
> “*I love u guys.*”
>
> *Emily Keyes’ final text message to her parents before dying in a Colorado school shooting, 2006*

For a minority of parents and their adolescents, differences lead to real splits and great stress (Steinberg & Morris, 2001). But most disagreements are at the level of harmless bickering. With sons, the issues often are behavior problems, such as acting out or hygiene; for daughters, the issues commonly involve relationships, such as dating and friendships (Schlomer et al., 2011). Most adolescents—6000 of them surveyed in 10 countries, from Australia to Bangladesh to Turkey—have said they like their parents (Offer et al., 1988). “We usually get along but . . . ,” adolescents often reported (Galambos, 1992; Steinberg, 1987).

Positive parent-teen relations and positive peer relations often go hand in hand. High school girls who had the most affectionate relationships with their mothers tended also to enjoy the most intimate friendships with girlfriends (Gold & Yanof, 1985). And teens who felt close to their parents have tended to be healthy and happy and to do well in school (Resnick et al., 1997). Of course, we can state this correlation the other way: Misbehaving teens are more likely to have tense relationships with parents and other adults.

Adolescence is typically a time of diminishing parental influence and growing peer influence. Asked in a survey if they had “ever had a serious talk” with their child about illegal drugs, 85 percent of American parents answered *Yes*. But if the parents had indeed given this earnest advice, many teens had apparently tuned it out: Only 45 percent could recall such a talk (Morin & Brossard, 1997).

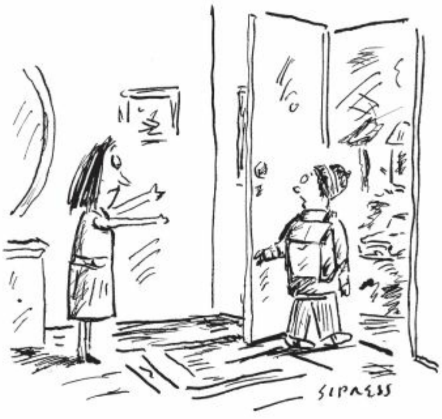
Heredity does much of the heavy lifting in forming individual temperament and personality differences, and peer influences do much of the rest. When with peers, teens discount the future and focus more on immediate rewards (O’Brien et al., 2011). Most teens are herd animals. They talk, dress, and act more like their peers than their parents. What their friends are, they often become, and what “everybody’s doing,” they often do. Teens’ social media use illustrates the power of peer influence. Compared to photos with few likes, teens prefer photos with many other likes—even photos of risky behaviors such as marijuana smoking. Moreover, when viewing many-liked photos, teens’ brains become more active in areas associated with reward processing and imitation (Sherman et al., 2016). Liking and doing what everybody else likes and does feels good.



Barbara Smaller The New Yorker Collection/The Cartoon Bank

“It’s you who don’t understand me—I’ve been fifteen, but you have never been forty-eight.”

Part of what everybody’s doing is networking—a lot. U.S. teens typically send 30 text messages daily and average 145 Facebook friends (Lenhart, 2015). They tweet, post videos to Snapchat, and share pictures on Instagram. Online communication stimulates intimate self-disclosure—both for better (support groups) and for worse (online predators and extremist groups) (Subrahmanyam & Greenfield, 2008; Valkenburg & Peter, 2009; Wilson et al., 2012).

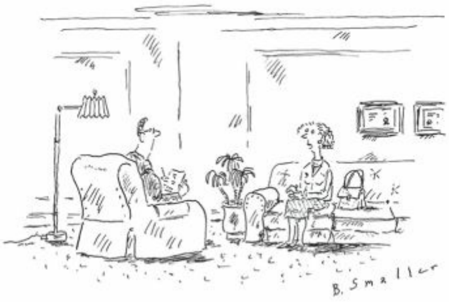


The New Yorker Collection, David Sipress/from cartoonbank.com. All Rights Reserved.

“I’m fourteen, Mom, I don’t do hugs.”

Both online and in real life, for those who feel excluded and bullied by their peers, the pain is acute. Most excluded “students suffer in silence. . . . A small number act out in violent ways against their classmates” (Aronson, 2001). The pain of exclusion also persists. In one large study, those who were bullied as children showed poorer physical health and greater psychological distress 40 years later (Takizawa et al., 2014).

So, for adolescents, peer approval matters. Yet in other ways, parental approval matters, too. Teens have seen their parents as influential in shaping their religious faith and in thinking about college and career choices (*Emerging Trends*, 1997). Most adolescents identify with their parents’ political views (Ojeda & Hatemi, 2015).



Barbara Smaller/Funny Times

“First, I did things for my parents’ approval, then I did things for my parents’ disapproval, and now I don’t know why I do things.”

Emerging Adulthood

52-3 What is *emerging adulthood*?

In the Western world, adolescence now roughly corresponds to the teen years. At earlier times, and in other parts of the world today, this slice of life has been much smaller (Baumeister & Tice, 1986). Shortly after sexual maturity, young people would assume adult responsibilities and status. The event might be celebrated with an elaborate initiation—a public rite of passage. The new adult would then work, marry, and have children.

When schooling became compulsory in many Western countries, independence was put on hold until after graduation. Adolescents are now taking more time to establish themselves as adults. In the United States, for example, the average age at first marriage has increased more than 5 years since 1960, to 29 for men, and 27 for women. In 1960, three in four women and two in three men had, by age 30, finished school, left home, become financially independent, married, and had a child. In the early twenty-first century, fewer than half of 30-year-old women and one-third of 30-year-old men were meeting these five milestones (Henig, 2010).

Together, later independence and earlier sexual maturity have widened the once-brief interlude between biological maturity and social independence (**Figure 52.2**). In prosperous communities, the time from 18 to the mid-twenties is an increasingly not-yet-settled phase of life, now often called **emerging adulthood** (Arnett, 2006, 2007; Reitzle, 2006). No longer adolescents, these emerging adults, having not yet assumed full adult responsibilities and independence, feel “in between.” After high school, those who enter the job market or go to college may be managing their own time and priorities. Yet they may be doing so from their parents’ home, unable to afford their own place and perhaps still emotionally dependent as well. Recognizing today’s more gradually emerging adulthood, the U.S. government now allows dependent children up to age 26 to remain on their parents’ health insurance (Cohen, 2010).

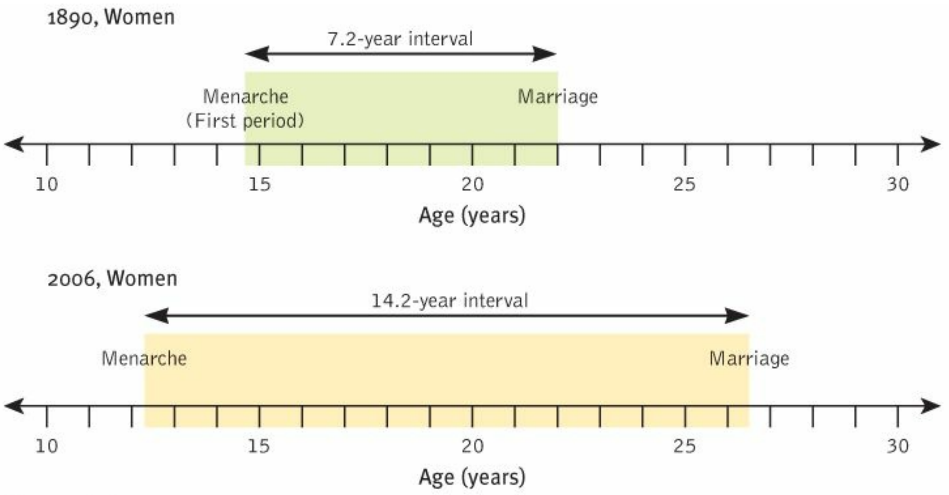


Figure 52.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 52.2 The transition to adulthood is being stretched from both ends

In the 1890s, the average interval between a woman's first menstrual period and marriage, which typically marked a transition to adulthood, was about 7 years. By 2006 in industrialized countries, that gap had widened to about 14 years (Finer & Philbin, 2014; Guttmacher Institute, 1994). Although many adults are unmarried, later marriage combines with prolonged education and earlier menarche to help stretch out the transition to adulthood.

emerging adulthood

a period from about age 18 to the mid-twenties, when many in Western cultures are no longer adolescents but have not yet achieved full independence as adults.

CAMPUS EVENTS
B. Smaller

Barbara Smaller/Funny Times

"I just don't know what to do with myself in that long stretch after college but before social security."

✓ Check Your Understanding

Ask Yourself

- What have been your best and worst experiences during adolescence? How have your experiences been influenced by environmental factors, such as your cultural context, and how have they been influenced by your inborn traits?

Test Yourself

- How has the transition from childhood to adulthood changed in Western cultures in the last century or so?
- Match the psychosocial development stage (1–8) with the issue that Erikson believed we wrestle with at that stage (a–h).

1. Infancy
2. Toddlerhood
3. Preschool
4. Elementary school
5. Adolescence
6. Young adulthood
7. Middle adulthood
8. Late adulthood

a. Generativity vs. stagnation
b. Integrity vs. despair
c. Initiative vs. guilt
d. Intimacy vs. isolation
e. Identity vs. role confusion
f. Competence vs. inferiority
g. Trust vs. mistrust
h. Autonomy vs. shame and doubt

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 52 REVIEW

52-1 What are the social tasks and challenges of adolescence?

- Erikson theorized that each life stage has its own psychosocial task, and that a chief task of adolescence is solidifying one's sense of self—one's *identity*. This often means "trying on" a number of different roles.
- *Social identity* is the part of the self-concept that comes from a person's group memberships.
- Erikson believed that adolescent identity formation is followed in young adulthood by a developing capacity for *intimacy*.

52-2 How do parents and peers influence adolescents?

- During adolescence, parental influence diminishes and peer influence increases.
- Most adolescents adopt their peers' ways of dressing, acting, and communicating.
- Parents have more influence in religion, politics, and college and career choices.

52-3 What is *emerging adulthood*?

- Due to earlier sexual maturity and later independence, the transition from adolescence to adulthood is taking longer than in the past.
- *Emerging adulthood* is the period from age 18 to the mid-twenties, when many young people are not yet fully independent. This stage is found mostly in today's Western cultures.

Multiple-Choice Questions

1. In many Western societies, it is common for adolescents to graduate from high school, go to college, and still live at home with their parents. They have not yet assumed full adult responsibilities and independence. Psychologists have identified this period of time as

a. adulthood.
b. early adulthood.
c. emerging adulthood.
d. late adolescence.
e. role confusion.

2. Which is true of social relations during the teen years?

a. As teens distance themselves from parents, peer relationships become more important.
b. High school girls who have the poorest relationships with their mothers have the most intense friendships with peers.
c. Parental influence peaks during mid to late adolescence.
d. Most adolescents have serious disagreements with parents, leading to great social stress.
e. Teens are generally more concerned with family relationships than peer relationships.

3. According to Erikson, the primary developmental task for adolescents is to develop a sense of

a. trust.
b. initiative.
c. competence.
d. identity.
e. intimacy.

4. Compared with the late nineteenth century, what is true about the transition from childhood to adulthood in Western cultures today?

a. It starts earlier and is completed earlier.
b. It starts later and is completed later.
c. It starts later and is completed earlier.
d. It starts earlier and is completed later.
e. It has not changed.

5. Megan, a third grader, is having trouble with math. She is starting to do poorly in other subjects, because she feels she cannot master math. Based on Erikson’s stages of psychosocial development, which stage is Megan in?

a. Autonomy versus shame and doubt
b. Initiative versus guilt
c. Competence versus inferiority
d. Identity versus role confusion
e. Intimacy versus isolation

Practice FRQs

1. What is emerging adulthood? Describe two trends that have led researchers to consider this an additional stage of life.

Answer

1 point: Emerging adulthood is the period in modern Western cultures during the late teens to the mid-twenties that bridges the gap between adolescent dependence and adult independence. Page 542

2 points: Longer years of schooling, and later age of marriage and moving out of the family home, are the trends that have led to recognition of this new stage. Page 543

2. Describe Erik Erikson’s stages of psychosocial development for each of the following:

- Marek, age 1
- Jessa, age 24
- Pauline, age 50
- Elsie, age 85

(4 points)

Module **53 Sexual Development**

LEARNING TARGETS

- 53-1 Describe how sex hormones influence prenatal and adolescent sexual development, and explain *intersex* conditions.
- 53-2 Discuss the factors that reduce the risk of sexually transmitted infections.
- 53-3 Discuss the factors that influence teenagers’ sexual behaviors and use of contraceptives.
- 53-4 Synthesize what research has taught us about sexual orientation.

The Nature of Gender: Our Biological Sex

53-1 How do sex hormones influence prenatal and adolescent sexual development, and what is an *intersex* condition?

In most physical ways—regulating heat with sweat, preferring energy-rich foods, growing calluses where the skin meets friction—men and women are similar. When looking for a mate, men and women also prize many of the same traits—someone who is kind, honest, and intelligent. But in some mating-related domains, as we will see, males tend to differ from females whether they're chimpanzees or elephants, rural peasants or corporate presidents (Geary, 2010).

In two ways, biology *influences* our gender psychology:

- *Genetically*—males and females have differing *sex chromosomes.*
- *Physiologically*—males and females have differing concentrations of *sex hormones*, which trigger other anatomical differences.

These two influences began to form you long before you were born.

Prenatal Sexual Development

Six weeks after you were conceived, you and someone of the other sex looked much the same. Then, as your genes kicked in, your biological sex—determined by your twenty-third pair of chromosomes (the two sex chromosomes)—became more apparent. Whether you are male or female, your mother's contribution to that chromosome pair was an **X chromosome.** From your father, you received the 1 chromosome out of 46 that is not unisex—either another X chromosome, making you female, or a **Y chromosome,** making you male.

X chromosome

the sex chromosome found in both males and females. Females typically have two X chromosomes; males typically have one. An X chromosome from each parent produces a female child.

Y chromosome

the sex chromosome typically found only in males. When paired with an X chromosome from the mother, it produces a male child.

About 7 weeks after conception, a single gene on the Y chromosome throws a master switch, which triggers the testes to develop and to produce **testosterone,** the main androgen (male hormone) that promotes male sex organ development. (Females also have testosterone, but less of it.)

testosterone

the most important male sex hormone. Both males and females have it, but the additional testosterone in males stimulates the growth of the male sex organs during the fetal period, and the development of the male sex characteristics during puberty.

Later, during the fourth and fifth prenatal months, sex hormones bathe the fetal brain and influence its wiring. Different patterns for males and females develop under the influence of the male's greater testosterone and the female's ovarian hormones (Hines, 2004; Udry, 2000). If, however, females are prenatally exposed to unusually high levels of male hormones, they tend to grow up with more male-typical activity interests (Endendijk et al., 2016). Prenatal hormones help sculpt what we love to do.

Adolescent Sexual Development

A flood of hormones triggers another period of dramatic physical change during adolescence, when boys and girls enter puberty. In this two-year period of rapid sexual maturation, pronounced male-female differences emerge. A variety of changes begin at about age 11 in girls and at about age 12 in boys, though the subtle beginnings of puberty, such as enlarging testes, appear earlier (Herman-Giddens et al., 2012). A year or two before the physical changes are visible, girls and boys often feel the first stirrings of physical attraction (McClintock & Herdt, 1996).

Girls' slightly earlier entry into puberty can at first propel them to greater height than boys of the same age (**Figure 53.1**). But boys catch up when they begin puberty, and by age 14, they are usually taller than girls. During these growth spurts, the **primary sex characteristics**—the reproductive organs and external genitalia—develop dramatically. So do the nonreproductive **secondary sex characteristics**. Girls develop breasts and larger hips. Boys' facial hair begins growing and their voices deepen. Pubic and underarm hair emerges in both girls and boys (**Figure 53.2**).

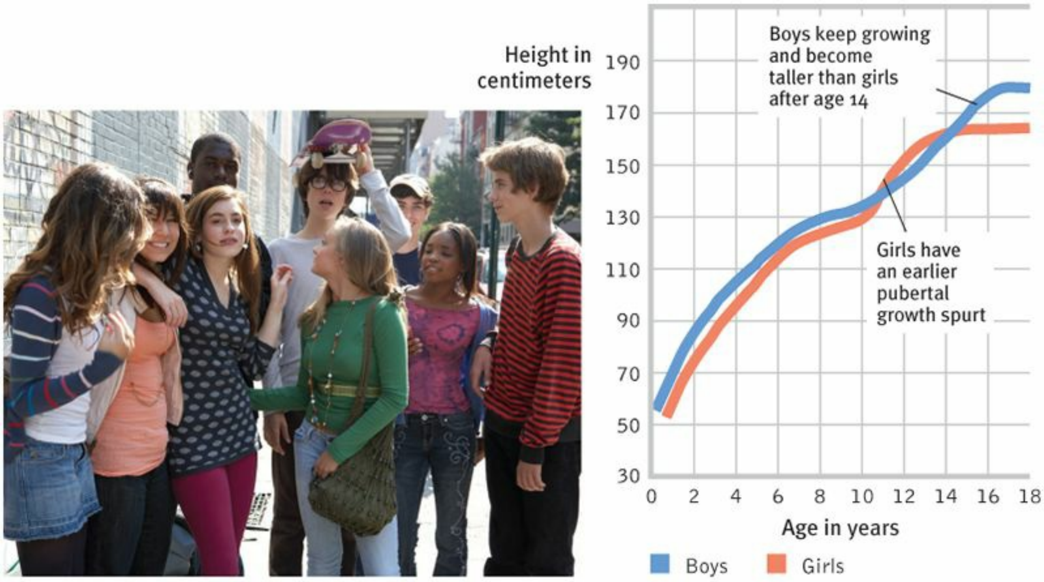


Figure 53.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Tanner, 1978.
Photo: Marili Forastieri/Getty Images

Figure 53.1 **Height differences**

Throughout childhood, boys and girls are similar in height. At puberty, girls surge ahead briefly, but then boys typically overtake them at about age 14.

primary sex characteristics

the body structures (ovaries, testes, and external genitalia) that make sexual reproduction possible.

secondary sex characteristics

nonreproductive sexual traits, such as female breasts and hips, male voice quality, and body hair.

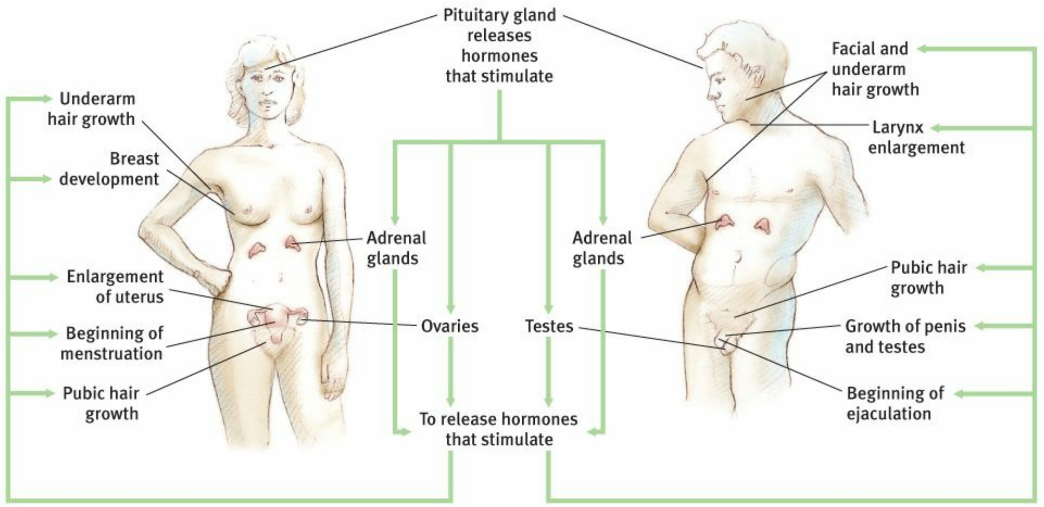

Pituitary gland
releases
hormones
that stimulate
Underarm
hair growth
Breast
development
Enlargement
of uterus
Beginning of
menstruation
Pubic hair
growth
Adrenal
glands
Ovaries
Testes
Adrenal
glands
To release hormones
that stimulate
Facial and
underarm
hair growth
Larynx
enlargement
Pubic hair
growth
Growth of penis
and testes
Beginning of
ejaculation

Figure 53.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 53.2 Body changes at puberty

At about age 11 in girls and age 12 in boys, a surge of hormones triggers a variety of visible physical changes.

FYI

Pubertal boys may not at first like their sparse beard. (But then it grows on them.)

For boys, puberty's landmark is the first ejaculation, which often occurs first during sleep (as a "wet dream"). This event, called **spermarche**, usually happens by about age 14.

spermarche

[sper-MAR-key] the first ejaculation.

In girls, the landmark is the first menstrual period, **menarche,** usually within a year of age 12½ (Anderson et al., 2003). Genes play a major role in predicting when girls experience menarche (Perry et al., 2014). But environment matters, too. Early menarche is more likely following stresses related to father absence, sexual abuse, insecure attachments, or a history of a mother's smoking during pregnancy (Rickard et al., 2014; Shrestha et al., 2011; Sung et al., 2016). As we saw in Module 51, girls are developing breasts and reaching puberty earlier than in the past.

menarche

[meh-NAR-key] the first menstrual period.

Girls prepared for menarche usually view it as a positive life transition (Chang et al., 2009). Males report mostly positive emotional reactions to spermarche (Fuller & Downs, 1990).

Sexual Development Variations

Nature may blur the biological line between males and females. **Intersex** individuals are born with unusual combinations of male and female chromosomes, hormones, and anatomy. For example, a genetic male may be born with normal male hormones and testes but no penis or a micropenis. Such individuals may struggle with their gender identity.

intersex

a condition present at birth due to unusual combinations of male and female chromosomes, hormones, and anatomy; possessing biological sexual characteristics of both sexes.

In the past, medical professionals often recommended *sex-reassignment surgery* to create an unambiguous sex identity for some children with this condition. One study reviewed 14 cases of genetic boys who had undergone early surgery and been raised as girls. Of those cases, 6 had later identified as male, 5 were living as females, and 3 reported an unclear male or female identity (Reiner & Gearhart, 2004).

In one famous case, a little boy lost his penis during a botched circumcision. His parents followed a psychiatrist's advice to raise him as a girl rather than as a damaged boy. So, with male chromosomes and hormones and female upbringing, did nature or nurture form this child's gender identity? Although raised as a girl, "Brenda" Reimer was not like most other girls. "She" didn't like dolls. She tore her dresses with rough-and-tumble play. At puberty she wanted no part of kissing boys. Finally, Brenda's parents explained what had happened, whereupon Brenda immediately rejected the assigned female identity. He cut his hair and chose a male name, David. He eventually married a woman and became a stepfather. Sadly, he later committed suicide (Colapinto, 2000). Today, experts generally recommend postponing any sex-reassignment surgery until a child's naturally developing physical appearance and gender identity become clear.

TOYOTA
Semenya

Michael Dalder/SEMENYA Reuters/Newscom

"I am who I am." Dramatic improvements in South African track star Caster Semenya's race times prompted the International Association of Athletics Federations to undertake sex testing in 2009. Semenya was reported to have physical characteristics not typically male or female. She was officially cleared to continue competing as a woman. Semenya declared, "God made me the way I am and I accept myself. I am who I am" (YOU, 2009). In 2016, she won an Olympic gold medal.

The bottom line: "Sex matters," concluded the National Academy of Sciences (2001). Sex-related genes and physiology "result in behavioral and cognitive differences between males and females." Yet, as we will see, environmental factors matter, too. Nature and nurture work together.

Sexually Transmitted Infections

53-2 How can sexually transmitted infections be prevented?

Every day, more than 1 million people worldwide acquire a *sexually transmitted infection* (*STI;* also called *STD,* for *sexually transmitted disease*) (WHO, 2013). “Compared with older adults,” reports the Centers for Disease Control (CDC, 2016), “sexually active adolescents aged 15–19 years and young adults aged 20–24 years are at higher risk.” Teenage girls, for example, are at heightened risk given their not fully mature anatomy and lower levels of protective antibodies (Dehne & Riedner, 2005; Guttmacher Institute, 1994).

Condoms offer only limited protection against certain skin-to-skin STIs, such as herpes, but they do reduce other risks (NIH, 2001). The effects were clear when Thailand promoted condom use by commercial sex workers. Over a 4-year period, as condom use soared from 14 to 94 percent, the annual number of bacterial STIs plummeted from 410,406 to 27,362 (WHO, 2000). When used by people with an infected partner, condoms also have been 80 percent effective in preventing transmission of *HIV* (*human immunodeficiency virus*—the virus that causes **AIDS**) (Weller & Davis-Beaty, 2002; WHO, 2003). Although HIV can be transmitted by other means, such as needle sharing during drug use, its sexual transmission is most common. Half of all humans with HIV (and one fourth of Americans with HIV) are women.

AIDS (acquired immune deficiency syndrome)

a life-threatening, sexually transmitted infection caused by the *human immunodeficiency virus (HIV).* AIDS depletes the immune system, leaving the person vulnerable to infections.

AIDS’ long incubation period means that many were infected in their teens and twenties. In 2012, the death of 1.6 million people with AIDS worldwide left behind countless grief-stricken loved ones, including millions of orphaned children (UNAIDS, 2013). In sub-Saharan Africa, home to two-thirds of those with HIV, medical treatment to extend life and care for the dying is sapping needed resources.

Having one sexual partner means also partnering with that partner's past partners—any one of whom might have unknowingly transmitted an STI. Hence, the first step in preventing STIs is knowing one's status, and sharing it with one's sexual partner.

Sexual Risk Taking and Teen Pregnancy

53-3 What factors influence teenagers’ sexual behaviors and use of contraceptives?

Sexual attitudes and behaviors vary dramatically across cultures and eras. “Sex between unmarried adults” is “morally unacceptable,” agree 97 percent of Indonesians and 6 percent of Germans (Pew, 2014). And thanks to decreased sexual activity and increased protection, American teen pregnancy rates are declining (CDC, 2016; Twenge et al., 2016).

Frank Schuermann/Newscom

Keeping abreast of hypersexuality An analysis of the 60 top-selling video games found 489 characters, 86 percent of whom were males (like most of the game players). The female characters were much more likely than the male characters to be “hypersexualized”—partially nude or revealingly clothed, with large breasts and tiny waists (Downs & Smith, 2010). Such depictions can lead to unrealistic expectations about sexuality and contribute to the early sexualization of girls. The American Psychological Association suggests countering this by teaching girls to “value themselves for who they are rather than how they look” (APA, 2007).

So, what produces variations in teen sexuality? Twin studies show that genes influence teen sexual behavior—by influencing pubertal development and hormone levels. But what environmental factors contribute?

Communication about birth control Many teenagers are uncomfortable discussing contraception with parents, partners, and peers. But teens who talk freely and openly with their parents and with their partner in an exclusive relationship are more likely to use contraceptives (Aspy et al., 2007; Milan & Kilmann, 1987).

Impulsivity Among sexually active 12- to 17-year-old American girls, 72 percent said they regretted having had sex (Reuters, 2000). If passion overwhelms intentions (either to use contraceptives or to delay having sex), unplanned sexual activity may result in pregnancy (Ariely & Loewenstein, 2006; MacDonald & Hynie, 2008).

Alcohol use Among late teens and young adults, most sexual hook-ups (casual encounters outside of a relationship) occur after alcohol use, often without knowing consent (Fielder et al., 2013; Garcia et al., 2013; Johnson & Chen, 2015). Those who use alcohol prior to sex are less likely to use condoms (Kotchick et al., 2001). By depressing the brain centers that control judgment, inhibition, and self-awareness, alcohol disarms normal restraints—a phenomenon well known to sexually coercive people.

Mass media Perceived peer norms influence teens' sexual behavior (Lyons et al., 2015; van de Bongardt et al., 2015). Teens pay attention to other teens, who, in turn, are influenced by popular media. Media help write the *social scripts* that affect our perceptions and actions. The more sexual content adolescents and young adults view or read (even when controlling for other predictors of early sexual activity), the more likely they are to perceive their peers as sexually active, to develop sexually permissive attitudes, and to experience early intercourse (Escobar-Chaves et al., 2005; Kim & Ward, 2012; Parkes et al., 2013). One study asked more than a thousand 12- to 14-year-olds what movies they had seen, and then after age 18 asked them about their sexual experiences (O'Hara et al., 2012). After controlling for various adolescent and family characteristics, the more the adolescents viewed movies with high sexual content, the greater was their sexual risk taking—with earlier first sex, more partners, and inconsistent condom use.

Several factors predict sexual restraint:

- **HIGH INTELLIGENCE.** Teens with high rather than average intelligence test scores more often delayed sex, partly because they considered possible negative consequences and were more focused on future achievement than on here-and-now pleasures (Harden & Mendle, 2011).
- **RELIGIOUS ENGAGEMENT.** Actively religious teens more often reserve sexual activity for adulthood or long-term relationships (Hull et al., 2011; Schmitt & Fuller, 2015; Štulhofer et al., 2011).
- **FATHER PRESENCE.** In studies that followed hundreds of New Zealand and U.S. girls from age 5 to 18, having Dad around has reduced the risk of teen pregnancy and of sexual activity before age 16 (Ellis et al., 2003). These associations held even after adjusting for other influences, such as poverty. Close family attachments—as in families that eat together and where parents know their teens' activities and friends—also predict later sexual initiation (Coley et al., 2008).
- **SERVICE LEARNING PARTICIPATION.** Several experiments have found that teens volunteering as tutors or teachers' aides, or participating in community projects, had lower pregnancy rates than did comparable teens randomly assigned to control conditions (Kirby, 2002; O'Donnell et al., 2002). Researchers are unsure why. Does service learning promote a sense of personal competence, control, and responsibility? Does it encourage more future-oriented thinking? Or does it simply reduce opportunities for unprotected sex? (Later school start times and after-school activities also reduced unplanned pregnancies [Bryan et al., 2016; Steinberg, 2015].)

✓ Check Your Understanding

Ask Yourself

- What do you think would be an effective strategy for reducing teen pregnancy?

Test Yourself

- Prenatal sexual development begins about __________ weeks after conception. Adolescence is marked by the onset of _____________.
- From a biological perspective, HIV is passed more readily from women to men than from men to women. True or false?
- Which THREE of the following five factors contribute to unplanned teen pregnancies?

  a. Alcohol use
  b. Higher intelligence level
  c. Father absence
  d. Mass media models
  e. Participating in service learning programs

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Sexual Orientation

53-4 What has research taught us about sexual orientation?

We express the *direction* of our sexual interest in our **sexual orientation**—which usually is our enduring sexual attraction toward members of our own sex *(homosexual orientation)* or the other sex *(heterosexual orientation)*. Other variations include an attraction to both sexes *(bisexual orientation)*. We experience our sexual orientation in our interests, thoughts, and fantasies.

sexual orientation

our enduring sexual attraction, usually toward members of our own sex (homosexual orientation) or the other sex (heterosexual orientation); variations include attraction toward both sexes (bisexual orientation).

Across time and place, cultures vary in their attitudes toward same-sex attractions. Same-sex sexual activity is "not wrong at all," said 11 percent of Americans in 1973, and 50 percent in 2016 (GSS, 2017). "Should society accept homosexuality?" *Yes*, say 88 percent of Spaniards and 1 percent of Nigerians, with women everywhere being more accepting than men (Pew, 2013). Yet whether a culture condemns or accepts same-sex unions, heterosexuality is most common, and bisexuality and homosexuality exist. In most African countries, same-sex relationships are illegal. Yet the ratio of lesbian, gay, or bisexual people "is no different from other countries in the rest of the world," reports the Academy of Science of South Africa (2015). What is more, same-sex activity spans human history, from the prehistoric rock art era to the present.

FYI

As explained in Module 49, sexual orientation is distinct from gender identity (including transgender identity).

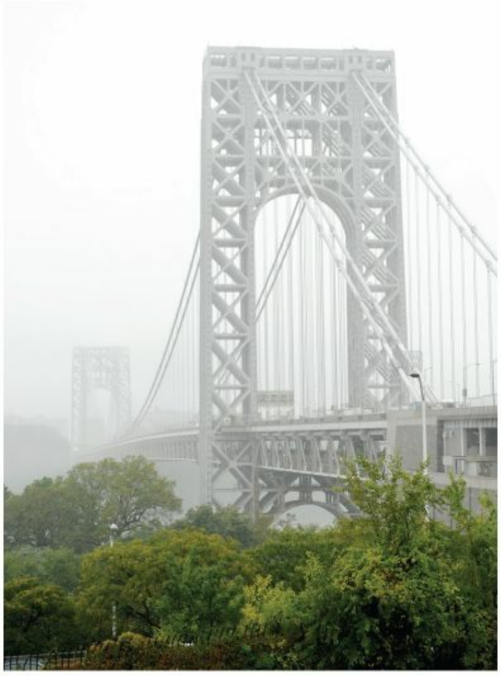
How many people are exclusively homosexual? According to more than a dozen national surveys in Europe and the United States, about 3 or 4 percent of men and 2 percent of women (Chandra et al., 2011; Herbenick et al., 2010; Savin-Williams et al., 2012). When the U.S. National Center for Health Statistics asked 34,557 Americans about their sexual identity, they found that all but 3.4 percent answered "straight," with 1.6 percent answering "gay" or "lesbian" and 0.7 percent saying "bisexual" (Ward et al., 2014). In a follow-up survey, 1.6 percent of women and 2.3 percent of men anonymously reported feeling "mostly" or "only" same-sex attraction (Copen et al., 2016). A larger number of adults—13 percent of women and 5 percent of men—report some same-sex sexual contact during their lives (Chandra et al., 2011). In less tolerant places, people are more likely to hide their sexual orientation (though they are no less likely to seek out same-sex content and partners, as evidenced by Google searches and Craigslist ads). About 3 percent of California men express a same-sex preference on Facebook, for example, as do only about 1 percent in Mississippi (MacInnis & Hodson, 2015; Stephens-Davidowitz, 2013).

FYI

In one British survey, of the 18,876 people contacted, 1 percent were seemingly asexual, having "never felt sexually attracted to anyone at all" (Bogaert, 2004, 2006).

What does it feel like to have same-sex attractions in a majority heterosexual culture? If you are heterosexual, imagine how you would feel if you were socially isolated for openly admitting or displaying your feelings. How would you react if you overheard people making crude jokes about heterosexual people, or if most movies, TV shows, and advertisements portrayed (or implied) homosexuality? And how would you answer if your family members were pleading with you to change your heterosexual "lifestyle" and to enter into a homosexual marriage?

Facing such reactions, some individuals struggle with their sexual attractions, especially during adolescence and if feeling rejected by parents or harassed by peers. If lacking social support, nonheterosexual teens may have lower self-esteem, higher anxiety and depression, and an increased risk of contemplating suicide (Becker et al., 2014; Lyons, 2015; Wang, J. et al., 2012, 2015). They may at first try to ignore or deny their desires, hoping they will go away. But they don't. They may try to change their orientation through psychotherapy, willpower, or prayer. But the feelings typically persist, as do those of heterosexual people—who are similarly incapable of change (Haldeman, 1994, 2002; Myers & Scanzoni, 2005).



STAN HONDA/Getty Images

Driven to suicide In 2010, Rutgers University student Tyler Clementi jumped off this bridge after his roommate secretly filmed, shared, and tweeted about Clementi's intimate encounter with another man. Reports then surfaced of other gay teens who had reacted in a similarly tragic fashion after being taunted. Since 2010, Americans—especially those under 30—have been increasingly supportive of those with same-sex orientations.

The prevalence of harmful anti-gay stereotypes can also contribute to the isolation and rejection that many nonheterosexual people feel. One such stereotype is that homosexual men are at risk for molesting children (Herek, 2016). But research shows that most men are sexually responsive either to adult women (if straight) or to adult men (if gay), and that some others—many fewer—instead exhibit *pedophilia,* a disordered attraction to young boys or girls (Blanchard et al., 2012; Dreger, 2011).

Today's psychologists view sexual orientation as neither willfully chosen nor willfully changed. Sexual orientation in some ways is like handedness: Most people are one way, some the other. A very few are truly ambidextrous. Regardless, the way one is endures. "Efforts to change sexual orientation are unlikely to be successful and involve some risk of harm," declared a 2009 American Psychological Association report. Recognizing this, in 2016, Malta became the first European country to outlaw the controversial practice of "conversion therapy," which aims to change people's gender identities or sexual orientations. Several U.S. states have likewise banned sexual conversion therapy with minors.

Sexual orientation is especially persistent for men. Women's sexual orientation tends to be less strongly felt and, for some women, is more fluid and changing (Dickson et al., 2013; Norris et al., 2015). In general, men are sexually simpler. Men's lesser sexual variability is apparent in many ways (Baumeister, 2000). Across time, across cultures, across situations, and across differing levels of education, religious observance, and peer influence, men's sexual drive and interests are less flexible and varying than are adult women's. Women, for example, more often prefer to alternate periods of high sexual activity with periods of almost none (Mosher et al., 2005). Baumeister calls this flexibility *erotic plasticity*.

Environment and Sexual Orientation

So, our sexual orientation seems to be something we do not choose and (especially for males) cannot change. Where, then, do these preferences come from? See if you can anticipate the conclusions that have emerged from hundreds of research studies by responding *Yes* or *No* to the following questions:

1. Is homosexuality linked with a child's problematic relationships with parents, such as with a domineering mother and an ineffectual father, or a possessive mother and a hostile father?

2. Does homosexuality involve a fear or hatred of people of the other sex, leading individuals to direct their desires toward members of their own sex?
3. Is sexual orientation linked with sex hormone levels currently in the blood?
4. As children, were most homosexuals molested, seduced, or otherwise sexually victimized by an adult homosexual?

The answer to all these questions has been *No* (Storms, 1983). In a search for possible environmental influences on sexual orientation, Kinsey Institute investigators interviewed nearly 1000 homosexuals and 500 heterosexuals. They assessed nearly every imaginable psychological cause of homosexuality—parental relationships, childhood sexual experiences, peer relationships, dating experiences (Bell et al., 1981; Hammersmith, 1982). Their findings: Homosexuals are no more likely than heterosexuals to have been smothered by maternal love or neglected by their father. In one national survey of nearly 35,000 adults, those with a same-sex attraction were somewhat more likely to report having experienced child sexual abuse. But 86 percent of the men and 75 percent of the women with same-sex attraction reported no such abuse (Roberts et al., 2013).

And consider this: If “distant fathers” were more likely to produce homosexual sons, then shouldn’t boys growing up in father-absent homes more often be gay? (They are not.) And shouldn’t the rising number of such homes have led to a noticeable increase in the gay population? (It has not.) Most children raised by gay or lesbian parents grow up straight (Gartrell & Bos, 2010). And they grow up within the normal range of healthfulness and emotional well-being (Bos et al., 2016).

Imagine that a mad scientist pitted nature against nurture by, at birth, changing a group of boys into girls—by castrating them, thus surgically feminizing them, and then raising them as girls. Surely this would socialize these “girls” into becoming attracted to males? In seven famous cases, this actually has happened, sometimes as a surgical procedure after the accidental severing of a penis during surgery. In each case, the result was a person attracted to *women*—just “the result we would expect if male sexual orientation were entirely due to nature,” concluded a consensus statement by sexual orientation experts (Bailey et al., 2016).

So, what else might influence sexual orientation? Could a same-sex experience have an effect? Even in tribal cultures in which homosexual behavior is expected of all boys before marriage, most men are heterosexual (Hammack, 2005; Money, 1987). (As this illustrates, homosexual *behavior* does not always indicate a homosexual *orientation.*) Moreover, though peers’ attitudes predict teens’ sexual attitudes and behavior, they do not predict same-sex attraction. “Peer influence has little or no effect” on sexual orientation (Brakefield et al., 2014).

FYI

Note that the scientific question is not “What causes homosexuality?” (or “What causes heterosexuality?”) but “What causes differing sexual orientations?” In pursuit of answers, psychological science compares the backgrounds and physiology of people whose sexual orientations *differ*.

The bottom line from a half-century’s theory and research: If there are environmental factors that influence sexual orientation after we’re born, we do not yet know what they are.

Biology and Sexual Orientation

The seeming absence of environmental influences on sexual orientation has motivated researchers to explore possible biological influences. They have considered

- evidence of same-sex behaviors in other species,
- gay-straight brain differences,
- genetics, and
- prenatal hormones.

Same-Sex Attraction in Other Species

In Boston's Public Gardens, caretakers solved the mystery of why a much-loved swan couple's eggs never hatched. Both swans were female. In New York City's Central Park Zoo, penguins Silo and Roy spent several years as devoted same-sex partners. Same-sex sexual behaviors have also been observed in several hundred other species, including grizzlies, gorillas, monkeys, flamingos, and owls (Bagemihl, 1999). Among rams, for example, some 7 to 10 percent display same-sex attraction by shunning ewes and seeking to mount other males (Perkins & Fitzgerald, 1997). Homosexual behavior seems a natural part of the animal world.

Gay-Straight Brain Differences

Researcher Simon LeVay (1991) studied sections of the hypothalamus taken from deceased heterosexual and homosexual people. As a gay scientist, LeVay wanted to do "something connected with my gay identity." To avoid biasing the results, he did a *blind study*, not knowing which donors were gay. For nine months he peered through his microscope at a cell cluster that varied in size among donors. Then, one morning, he broke the code: One cell cluster was reliably larger in heterosexual men than in women and homosexual men. "I was almost in a state of shock," LeVay said (1994). "I took a walk by myself on the cliffs over the ocean. I sat for half an hour just thinking what this might mean."

It should not surprise us that in other ways, too, brains differ with sexual orientation (Bao & Swaab, 2011; Savic & Lindström, 2008). Remember our maxim: *Everything psychological is simultaneously biological*. But when do such brain differences begin? At conception? In the womb? During childhood or adolescence? Does experience produce these differences? Or is it genes or prenatal hormones (or genes activating prenatal hormones)?

LeVay does not view the hypothalamus as a sexual orientation center; rather, he sees it as an important part of the neural pathway engaged in sexual behavior. He acknowledges that sexual behavior patterns may influence the brain's anatomy. In fish, birds, rats, and humans, brain structures vary with experience—including sexual experience, reports sex researcher Marc Breedlove (1997). But LeVay believes it more likely that brain anatomy influences sexual orientation. His hunch seems confirmed by the discovery of a similar hypothalamic difference between the male sheep that do and don't display same-sex attraction (Larkin et al., 2002; Roselli et al., 2002, 2004). Moreover, such differences seem to develop soon after birth, or perhaps even before birth (Rahman & Wilson, 2003).

Boston Globe/Getty Images

Juliet and Juliet Boston's beloved swan couple, "Romeo and Juliet," were discovered actually to be, as are many other animal partners, a same-sex pair.

Responses to hormone-derived sexual scents also point to a brain difference (Savic et al., 2005). When straight women were given a whiff of a scent derived from men's sweat, their hypothalamus activated in an area governing sexual arousal. Gay men's brains responded similarly to the men's scent. But straight men's brains showed the arousal response only to a female hormone derivative. Other studies of brain responses to sex-related sweat odors and to pictures of male and female faces have found similar gay-straight differences, including differing responses between lesbians and straight women (Kranz & Ishai, 2006; Martins et al., 2005). Researcher Qazi Rahman (2015) sums it up: Compared with heterosexuals, "gay men appear, on average, more 'female typical' in brain pattern responses and lesbian women are somewhat more 'male typical.'"

Genetic Influences

Evidence indicates that "about a third of variation in sexual orientation is attributable to genetic influences" (Bailey et al., 2016). A same-sex orientation does have some tendency to run in families. And identical twins are somewhat more likely than fraternal twins to share a homosexual orientation (Alanko et al., 2010; Långström et al., 2010). Because sexual orientations differ in many identical twin pairs, especially female twins, we know that other factors besides genes are also at work—including, it appears, epigenetic marks that help distinguish gay and straight identical twins (Balter, 2015).

By genetic manipulations, experimenters have created female fruit flies that pursued other females during courtship, and males that pursued other males (Demir & Dickson, 2005). “We have shown that a single gene in the fruit fly is sufficient to determine all aspects of the flies’ sexual orientation and behavior,” explained Barry Dickson (2005). With humans, it’s likely that multiple genes, possibly in interaction with other influences, shape sexual orientation. A genome-wide study of 409 pairs of gay brothers identified sexual orientation links with areas of two chromosomes, one maternally transmitted (Sanders et al., 2015).

Researchers have speculated about possible reasons why “gay genes” might exist in the human gene pool, given that same-sex couples cannot naturally reproduce. One possible answer is kin selection. Recall from Module 15 the evolutionary psychology reminder that many of our genes also reside in our biological relatives. Perhaps, then, gay people’s genes live on through their supporting the survival and reproductive success of their nieces, nephews, and other relatives. Gay men make generous uncles, suggests one study of Samoans (Vasey & VanderLaan, 2010).

A *fertile females theory* suggests that maternal genetics may also be at work (Bocklandt et al., 2006). Italian studies confirm what others have found—that homosexual men tend to have more homosexual relatives on their mother’s side than on their father’s (Camperio-Ciani et al., 2004, 2009; Camperio-Ciani & Pellizzari, 2012; VanderLaan & Vasey, 2011; VanderLaan et al., 2012). And the relatives on the mother’s side also produce more offspring than do the maternal relatives of heterosexual men. Perhaps the genes that dispose some women to conceive more children with men also dispose some men to be attracted to men (LeVay, 2011). Thus, the decreased reproduction by gay men appears offset by the increased reproduction by their maternal extended family.

Prenatal Influences

Elevated rates of homosexual orientation in identical *and* fraternal twins suggest an influence not only of shared genes but also a shared prenatal environment. Recall that in the womb, sex hormones direct our development as male or female. In animals and some human cases, prenatal hormone conditions have altered a fetus' sexual orientation. German researcher Gunter Dorner (1976, 1988) pioneered research on the influence of prenatal hormones by manipulating a fetal rat's exposure to male hormones, thereby "inverting" its sexual orientation. In other studies, when pregnant sheep were injected with testosterone during a critical period of fetal development, their female offspring later showed homosexual behavior (Money, 1987).

A critical period for the human brain's neural-hormonal control system may exist during the second trimester (Ellis & Ames, 1987; Garcia-Falgueras & Swaab, 2010; Meyer-Bahlburg, 1995). Exposure to the hormone levels typically experienced by female fetuses during this time appears to predispose the person (whether female or male) to be attracted to males in later life. "Prenatal sex hormones control the sexual differentiation of brain centers involved in sexual behaviors," notes Simon LeVay (2011, p. 216). Thus, female fetuses most exposed to testosterone appear most likely later to exhibit gender-atypical traits and experience same-sex desires. (For males, prenatal testosterone exposure, given a sufficient minimum amount, seems not to affect sexual orientation [Breedlove, 2017].)

The mother's immune system may also play a role in the development of sexual orientation. Men with older brothers are somewhat more likely to be gay, report Ray Blanchard (2004, 2008a,b, 2014) and Anthony Bogaert (2003)—about one-third more likely for each additional older brother. If the odds of homosexuality are roughly 2 percent among first sons, they would rise to about 2.6 percent among second sons, 3.5 percent for third sons, and so on for each additional older brother (Bailey et al., 2016; see **Figure 53.3**).

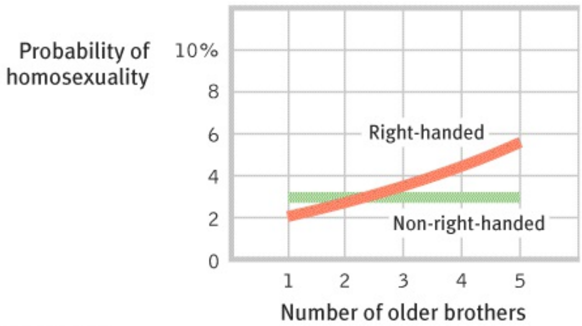


Figure 53.3
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Figure 53.3 The older brother effect

Researcher Ray Blanchard (2008a) offers these approximate curves depicting a man's likelihood of homosexuality as a function of the number of biological (not adopted) older brothers he has. This correlation has been found in several studies, but only among right-handed men (as about 9 in 10 men are).

The reason for this curious phenomenon—the *older brother* or *fraternal birth-order effect*—is unclear. Blanchard suspects a defensive maternal immune response to foreign substances produced by male fetuses. With each pregnancy with a male fetus, the maternal antibodies may become stronger and may prevent the fetus' brain from developing in a male-typical pattern. Consistent with this biological explanation, the fraternal birth-order effect occurs only in men with older brothers born to the same mother (whether raised together or not). Sexual orientation is unaffected by adoptive brothers (Bogaert, 2006). The birth-order effect on sexual orientation is not found among women with older sisters, women who were womb-mates of twin brothers, and men who are not right-handed (Rose et al., 2002).

Gay-Straight Trait Differences

Comparing the traits of gay and straight people is akin to comparing the heights of men and women. The average man is taller than most women, but many women are taller than most men. And just as knowing someone's height doesn't specify their sex, so also knowing someone's traits doesn't tell you their sexual orientation. Yet on several traits, the average homosexual female or male is intermediate between straight females and males (**Table 53.1**; see also LeVay, 2011; Rahman & Koerting, 2008; Rieger et al., 2016). For example, lesbians’ cochlea and hearing systems develop in a way that is intermediate between those of heterosexual females and heterosexual males, which seems attributable to prenatal hormonal influence (McFadden, 2002). From birth on, gay males tend to be shorter and lighter than straight males, while from birth on, lesbian females tend to be heavier than straight females (Bogaert, 2010; Deputy & Boehmer, 2014; Frisch & Zdravkovic, 2010). Facial structure and fingerprint ridge counts may also differ (Hall & Kimura, 1994; Mustanski et al., 2002; Sanders et al., 2002; Skorska et al., 2015).

TABLE 53.1 Biological Correlates of Sexual Orientation

Gay-straight trait differences

Sexual orientation is part of a package of traits. Studies—some in need of replication—indicate that homosexuals and heterosexuals differ in the following biological and behavioral traits:

- spatial abilities
- fingerprint ridge counts
- auditory system development
- handedness
- occupational preferences
- relative finger lengths
- gender nonconformity
- age of onset of puberty in males
- face structure and birth size/weight
- sleep length
- physical aggression
- walking style

On average (the evidence is strongest for males), results for gays and lesbians fall between those of straight men and straight women. Three biological influences—brain, genetic, and prenatal—may contribute to these differences.

Brain differences

- One hypothalamic cell cluster is smaller in women and gay men than in straight men.
- Gay men’s hypothalamus reacts as does straight women’s to the smell of men’s sex-related hormones.

Genetic influences

- Shared sexual orientation is higher among identical twins than among fraternal twins.
- Sexual attraction in fruit flies can be genetically manipulated.
- Male homosexuality often appears to be transmitted from the mother’s side of the family.

Prenatal influences

- Altered prenatal hormone exposure may lead to homosexuality in humans and other animals.
- Men with several older biological brothers are more likely to be gay, possibly due to a maternal immune-system reaction.

Another you-never-would-have-guessed-it gay-straight difference appears in studies showing that gay men's spatial abilities resemble those typical of straight women (Cohen, 2002; Gladue, 1994; McCormick & Witelson, 1991; Sanders & Wright, 1997). On mental rotation tasks such as the one illustrated in **Figure 53.4**, straight men tend to outscore straight women. (So do women who were womb-mates of a male co-twin [Vuoksimaa et al., 2010].) Researchers find that, as on a number of other measures, the scores of gays and lesbians fall between those of heterosexual males and females (Rahman et al., 2004, 2008). But straight women and gays have both outperformed straight men at remembering objects' spatial locations in memory game tasks (Hassan & Rahman, 2007).

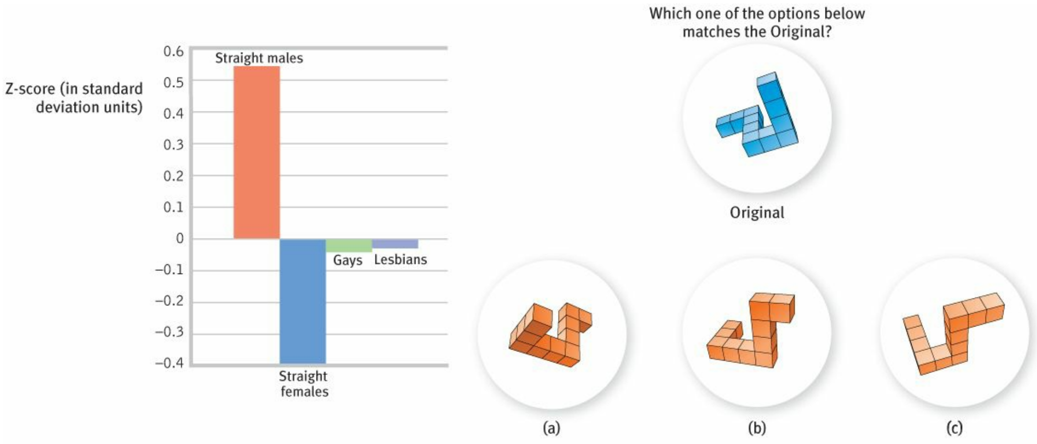

Figure 53.4
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Figure 53.4 Spatial abilities and sexual orientation

Which of the three figures can be rotated to match the original figure at the top? Straight males tend to find this type of mental rotation task easier than do straight females, with gays and lesbians falling in between (Rahman et al., 2004)[1].

***

The consistency of the brain, genetic, and prenatal findings has swung the pendulum toward a biological explanation of sexual orientation (Rahman & Wilson, 2003; Rahma & Koerting, 2008). Still, some people wonder: Should the cause of sexual orientation matter? Perhaps it shouldn't, but people's assumptions matter. If you see sexual orientation as inborn—as shaped by biological and prenatal influences—then you likely favor "equal rights for homosexual and bisexual people" (Bailey et al., 2016). If you see same-sex attraction as a lifestyle choice or as encouraged by social tolerance, then you likely oppose equal rights for nonheterosexual people. To justify his signing a 2014 bill that made some homosexual acts punishable by life in prison, the president of Uganda, Yoweri Museveni, declared that homosexuality is not inborn but rather is a matter of "choice" (Balter, 2014; Landau et al., 2014).

> “*Modern scientific research indicates that sexual orientation is . . . partly determined by genetics, but more specifically by hormonal activity in the womb.*”
>
> *Glenn Wilson and Qazi Rahman,* Born Gay: The Psychobiology of Sex Orientation, *2005*

However, the new biological research is a double-edged sword (Roan, 2010). If sexual orientation, like skin color and sex, is genetically influenced, that does offer a rationale for civil rights protection—though not the only rationale, argue rights advocates (Diamond & Rosky, 2016). Yet this research raises the troubling possibility that genetic markers of sexual orientation could someday be identified through fetal testing, that a fetus could be aborted simply for being predisposed to an unwanted orientation, or that hormonal treatment in the womb might engineer a desired orientation.

> “*There is no sound scientific evidence that sexual orientation can be changed.*”
>
> *UK Royal College of Psychiatrists, 2009*

Check Your Understanding

Ask Yourself

- Based on what you’ve learned so far, how would you say that genes, the brain, hormones, and environment work together to influence sexual development, sexual behavior, and sexual orientation?

Test Yourself

- Which THREE of the following five factors have researchers found to have an effect on sexual orientation?

  a. A domineering mother
  b. The size of a certain cell cluster in the hypothalamus
  c. Prenatal hormone exposure
  d. A distant or ineffectual father
  e. For right-handed men, having multiple older biological brothers

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 53 REVIEW

53-1 How do sex hormones influence prenatal and adolescent sexual development, and what is an *intersex* condition?

- About 7 weeks after conception, a gene on the Y chromosome triggers the production of *testosterone* in males. This promotes male sex organ development.
- During the fourth and fifth prenatal months, sex hormones bathe the fetal brain. Different patterns develop as a result of the male's greater testosterone and the female's ovarian hormones. Prenatal exposure of females to unusually high levels of male hormones can dispose them to more male-typical activity interests later on.
- Another flood of hormones occurs in puberty, triggering a growth spurt, the development of *primary* and *secondary sex characteristics*, and the landmark events of *spermarche* and *menarche.*
- *Intersex* individuals are born with intermediate or unusual combinations of male and female chromosomes, hormones, and anatomy.

53-2 How can sexually transmitted infections be prevented?

- Safer sex practices help prevent sexually transmitted infections (STIs).
- Condoms, while offering limited protection against skin-to-skin STIs, are especially effective in preventing transmission of HIV, the virus that causes *AIDS.*
- Knowing one's STI status and sharing it with one's sexual partner is key to prevention.

53-3 What factors influence teenagers' sexual behaviors and use of contraceptives?

- Sexual behaviors and attitudes vary from culture to culture and era to era.

- Factors contributing to teen pregnancy include minimal communication about birth control with parents, partners, and peers; impulsivity; alcohol use; and mass media influences.
- High intelligence, religious engagement, father presence, and participation in service learning programs have been predictors of teen sexual restraint.

53-4 What has research taught us about sexual orientation?

- *Sexual orientation* is an enduring sexual attraction, usually toward members of one's own sex (homosexual orientation) or the other sex (heterosexual orientation). Variations include attraction toward both sexes (bisexual orientation).
- Today's psychologists view sexual orientation as neither willfully chosen nor willfully changed.
- There is no evidence that environmental influences determine sexual orientation.
- Evidence for biological influences includes the presence of same-sex attraction in many animal species, straight-gay differences in body and brain characteristics, higher rates of homosexuality in certain families and in identical twins, the effect of exposure to certain hormones during critical periods of prenatal development, and the fraternal birth-order effect.

Multiple-Choice Questions

1. A child who is genetically female

- a. has received an X chromosome from her mother and a Y chromosome from her father.
- b. has received a Y chromosome only from her mother.
- c. has received a Y chromosome from her mother and an X chromosome from her father.
- d. has received two X chromosomes from her mother and none from

her father.

e. has received an X chromosome from her father and her mother.

2. Which of the following is a primary sex characteristic that changes at puberty?

a. A growth spurt in height, especially for boys
b. Development of breasts for girls
c. Full development of external genitalia in both sexes
d. Facial hair and deepened voice for boys
e. Appearance of pubic and underarm hair in both sexes

3. Which of the following has been shown to be an effective intervention to reduce teen pregnancies?

a. Abstinence-only sex education in schools
b. Participation in service learning programs
c. Increasing guilt related to sexual activity
d. Taking a pledge to remain abstinent
e. Increased exposure to sexual content in the media

Practice FRQs

1. Provide examples of a primary and a secondary sex characteristic for both males and females.

Answer

1 point: Male primary sex characteristics include growth of penis and testes and first ejaculation (spermarche). Page 546

1 point: Male secondary sex characteristics include body hair and lower voice. Page 546

1 point: Female primary sex characteristics include menarche and full development of external genitalia. Page 546

1 point: Female secondary sex characteristics include body hair, widening of the hips, and growth of breasts. Page 546

2. Explain evidence that suggests a genetic influence on sexual orientation from each of the following types of studies:

- Family studies
- Twin studies
- Animal studies

(3 points)

Module **54 Adulthood: Physical, Cognitive, and Social Development**

LEARNING TARGETS

- 54-1 Identify the physical changes that occur during middle and late adulthood.
- 54-2 Assess how memory changes with age.
- 54-3 Discuss how neurocognitive disorders and Alzheimer's disease affect cognitive ability.
- 54-4 Discuss the themes and influences that mark our social journey from early adulthood to death.
- 54-5 Describe changes in well-being across the life span.
- 54-6 Describe the range of reactions to the death of a loved one.

The unfolding of our lives continues across the life span. It is, however, more difficult to generalize about adulthood stages than about life's early years. If you know that James is a 1-year-old and Jamal is a 10-year-old, you could say a great deal about each child. Not so with adults who differ by a similar number of years. The boss may be 30 or 60; the marathon runner may be 20 or 50; the 19-year-old may be a parent who supports a child or a child who receives an allowance. Yet our life courses are in some ways similar. Physically, cognitively, and especially socially, we differ at age 50 from our 25-year-old selves. In the discussion that follows, we recognize these differences and use three terms: *early adulthood* (roughly twenties and thirties), *middle adulthood* (to age 65), and *late* *adulthood* (the years after 65). Within each of these stages, people will vary widely in physical, psychological, and social development.

Physical Development

54-1 What physical changes occur during middle and late adulthood?

Like the declining daylight after the summer solstice, our physical abilities—muscular strength, reaction time, sensory keenness, and cardiac output—all begin an almost imperceptible decline in our mid-twenties. Athletes are often the first to notice. Baseball players peak at about age 27—with 60 percent of Most Valuable Player awardees since 1985 coming within 2 years of that age (Silver, 2012). But most of us—especially those of us whose daily lives do not require top physical performance—hardly perceive the early signs of decline.

Physical Changes in Middle Adulthood

Athletes over 40 know all too well that physical decline gradually accelerates. As a lifelong basketball player, I [DM] find myself increasingly not racing for that loose ball. But even diminished vigor is sufficient for normal activities. Moreover, during early and middle adulthood, physical vigor has less to do with age than with a person's health and exercise habits. Many physically fit 50-year-olds run four miles with ease, while sedentary 25-year-olds find themselves huffing and puffing up two flights of stairs.

FYI

How old does a person have to be before you think of him or her as old? Depends on who you ask. For 18- to 29-year-olds, 67 was old. For those 60 and over, old was 76 (Yankelovich, 1995).

Aging also brings a gradual decline in fertility, especially for women. For a 35- to 39-year-old woman, the chance of getting pregnant after a single act of intercourse is only half that of a woman 19 to 26 (Dunson et al., 2002). Men experience a gradual decline in sperm count, testosterone level, and speed of erection and ejaculation. Women experience **menopause,** as menstrual cycles end, usually within a few years of age 50. Some may experience distress, as do some men who experience declining virility and physical capacities. But most people age without such problems.

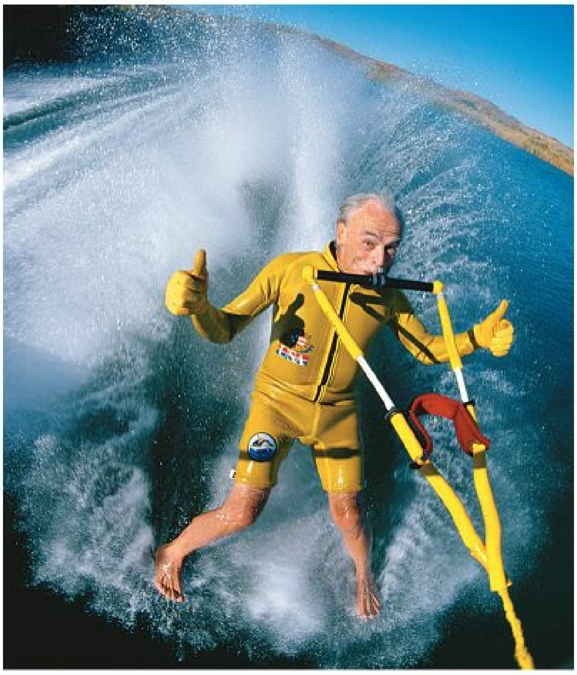
menopause
the time of natural cessation of menstruation; also refers to the biological changes a woman experiences as her ability to reproduce declines.

With age, sexual activity lessens. Nearly 9 in 10 Americans in their late twenties reported having had vaginal intercourse in the past year, compared with 22 percent of women and 43 percent of men over 70 (Herbenick et al., 2010; Reece et al., 2010). Nevertheless, most men and women remain capable of satisfying sexual activity, and most express satisfaction with their sex life. This was true of 70 percent of Canadians surveyed (ages 40 to 64) and 75 percent of Finns (ages 65 to 74) (Kontula & Haavio-Mannila, 2009; Wright, 2006). In one survey, 75 percent of respondents reported being sexually active into their eighties (Schick et al., 2010). And in an American Association of Retired Persons sexuality survey, it was not until age 75 or older that most women and nearly half of men reported little sexual desire (DeLamater, 2012; DeLamater & Sill, 2005). Given good health and a willing partner, the flames of desire, though simmered down, live on. As Alex Comfort (1992, p. 240) jested, “The things that stop you having sex with age are exactly the same as those that stop you riding a bicycle (bad health, thinking it looks silly, no bicycle).”

Physical Changes in Late Adulthood

Is old age “more to be feared than death” (Juvenal, *The Satires*)? Or is life “most delightful when it is on the downward slope” (Seneca, *Epistulae ad*

Lucilium)? What is it like to grow old?



Rick Doyle/Corbis Documentary/Getty Images

Adult abilities vary widely George Blair was, at age 92, the world's oldest barefoot water skier. He is shown here in 2002 when he first set the record, at age 87. (He died in 2013 at age 98.)

Life Expectancy

From 1950 to 2015, life expectancy at birth increased worldwide from 46.5 years to 71 years—and to 80 and beyond in twenty-nine countries (WHO, 2016). What a gift—two decades more of life! In China, the United States, the United Kingdom, Canada, and Australia (to name some countries where students read this book), life expectancy has risen to 76, 79, 81, 82, and 82, respectively (WHO, 2016). This increasing life expectancy (humanity's greatest achievement, say some) combines with decreasing birthrates: Older adults are a growing population segment, creating an increasing demand for hearing aids, retirement villages, and nursing homes. Today, 1 in 10 people worldwide are 60 or older. The United Nations (2015) projects that number will triple to nearly 3 in 10 by 2100 (and to nearly 4 in 10 in Europe).

Throughout the life span, males are more prone to dying. Although 126 male embryos begin life for every 100 females, the sex ratio is down to 105 males for every 100 females at birth (Strickland, 1992). During the first year, male infants' death rates exceed females' by one-fourth. Worldwide, women outlive men by 4.7 years (WHO, 2016). (Rather than marrying a man older than themselves, 20-year-old women who want a husband who shares their life expectancy should wait for the 16-year-old boys to mature.) By age 100, women outnumber men 5 to 1.

But few of us live to 100. Disease strikes. The body ages. Its cells stop reproducing. It becomes frail and vulnerable to tiny insults—hot weather, a fall, a mild infection—that at age 20 would have been trivial. Tips of chromosomes, called *telomeres*, wear down, much as the tip of a shoelace frays. This wear is accelerated by smoking, obesity, or stress. Breast-fed children have longer telomeres, while those who suffer frequent abuse or bullying exhibit the biological scars of shortened telomeres (Shalev et al., 2013). As telomeres shorten, aging cells may die without being replaced with perfect genetic replicas (Epel, 2009).

> “*I intend to live forever—so far, so good.*”
>
> *Comedian Steven Wright*

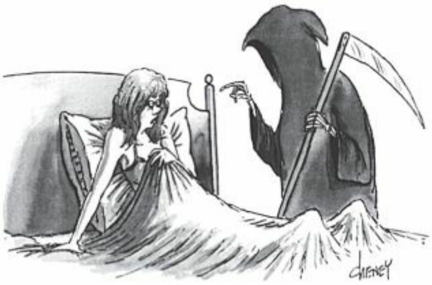
Low stress and good health habits enable longevity, as does a positive spirit. Chronic anger and depression increase our risk of premature death. Researchers have even observed an intriguing *death-deferral* phenomenon (Shimizu & Pelham, 2008). Across one 15-year period, 2000 to 3000 more Americans died on the two days after Christmas than on Christmas and the two days before. The death rate also increases when people reach their birthdays, and when they survive until after other milestones, like the first day of the new millennium.

Pascal Parrot/Getty Images

World record for longevity? French woman Jeanne Calment, the oldest human in history with authenticated age, died in 1998 at age 122. At age 100, she was still riding a bike. At age 114, she became the oldest film actor ever, by portraying herself in *Vincent and Me.*

Sensory Abilities, Strength, and Stamina

Although physical decline begins in early adulthood, we are not usually acutely aware of it until later in life, when the stairs get steeper, the print gets smaller, and other people seem to mumble more. Visual sharpness diminishes, as does distance perception and adaptation to light-level changes. Muscle strength, reaction time, and stamina also diminish, as do smell, hearing, and touch. In Wales, teens' loitering around a convenience store has been discouraged by a device that emits an aversive high-pitched sound that almost no one over 30 can hear (Lyall, 2005).



The New Yorker Collection, 1999 Tom Cheney
from cartoonbank.com

"Happy fortieth. I'll take the muscle tone in your upper arms, the girlish timbre of your voice, your amazing tolerance for caffeine, and your ability to digest french fries. The rest of you can stay."

With age, the eye's pupil shrinks and its lens becomes less transparent, reducing the amount of light reaching the retina. A 65-year-old retina receives only about one-third as much light as its 20-year-old counterpart (Kline & Schieber, 1985). Thus, to see as well as a 20-year-old when reading or driving, a 65-year-old needs three times as much light—a reason for buying cars with untinted windshields. This also explains why older people sometimes ask younger people, "Don't you need better light for reading?"

Health

As people age, they care less about what their bodies look like and more about how their bodies function. For those growing older, there is both bad and good news about health. The bad news: The body's disease-fighting immune system weakens, making older adults more susceptible to life-threatening ailments such as cancer and pneumonia. The good news: Thanks partly to a lifetime's accumulation of antibodies, people over 65 suffer fewer short-term ailments, such as common flu and cold viruses. One study found they were half as likely as 20-year-olds and one-fifth as likely as preschoolers to suffer upper respiratory flu each year (National Center for Health Statistics, 1990).

FYI

Most stairway falls taken by older people occur on the top step, precisely where the person typically descends from a window-lit hallway into the darker stairwell (Fozard & Popkin, 1978). Our knowledge of aging could be used to design environments that would reduce such accidents (National Research Council, 1990).

The Aging Brain

Up to the teen years, we process information with greater and greater speed (Fry & Hale, 1996; Kail, 1991). But compared with you, older people take a bit more time to react, to solve perceptual puzzles, even to remember names (Bashore et al., 1997; Verhaeghen & Salthouse, 1997). At video games, most 70-year-olds are no match for a 20-year-old. This processing lag can also have deadly consequences (Aichele et al., 2016). As **Figure 54.1** indicates, fatal accident rates per mile driven increase sharply after age 75. By age 85, they exceed the 16-year-old level. Older drivers appear to focus well on the road ahead, but attend less to other vehicles approaching from the side (Pollatsek et al., 2012). Nevertheless, because older people drive less, they account for fewer than 10 percent of crashes (Coughlin et al., 2004).

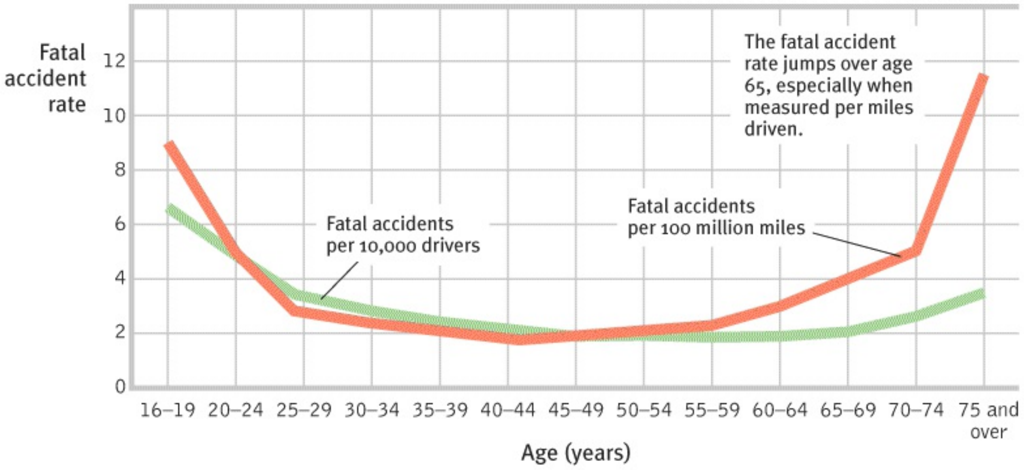


Figure 54.1
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Figure 54.1 Age and driver fatalities

Slowing reactions contribute to increased accident risks among those 75 and older, and their greater fragility increases their risk of death when accidents happen (NHTSA, 2000). Would you favor driver exams based on performance, not age, to screen out those whose slow reactions or sensory impairments indicate accident risk?

Brain regions important to memory begin to atrophy during aging (Fraser et al., 2015; Ritchie et al., 2015). The blood-brain barrier also breaks down beginning in the hippocampus, which furthers cognitive decline (Montagne et al., 2015). No wonder older adults feel older after taking a memory test: It's like "aging 5 years in 5 minutes," joked one research team (Hughes et al., 2013). In early adulthood, a small, gradual net loss of brain cells begins, contributing by age 80 to a brain-weight reduction of 5 percent or so. Earlier, we noted that late-maturing frontal lobes, which help us override our undesirable urges, help account for teen impulsivity. Late in life, some of that impulsiveness often returns as those same frontal lobes begin to atrophy, seemingly explaining older people's occasional blunt questions ("Have you put on weight?") or inappropriate comments (von Hippel, 2007, 2015). But good news: There is still some *plasticity* in the aging brain, which partly compensates for what it loses by recruiting and reorganizing neural networks (Park & McDonough, 2013). During memory tasks, for example, the left frontal lobes are especially active in young adult brains, while older adult brains use both left and right frontal lobes.

Nicole Bengiveno/The New York Times/Redux Pictures

Suiting up for old age A long life is a gift. To reach old age, it takes good genes, a nurturing environment, and a little luck. New technology allows you to put yourself in your elders' shoes. In these special suits, younger people can hear, see, and move as if they were 85 years old.

Exercise and Aging

And more good news: Exercise slows aging, as shown in studies of identical twin pairs in which only one twin exercised (Iso-Markku et al., 2016; Rottensteiner et al., 2015). Active older adults tend to be mentally quick older adults. Physical exercise not only enhances muscles, bones, and energy and helps prevent obesity and heart disease, it maintains the telomeres that protect the chromosome ends and even appears to slow the progression of Alzheimer's disease (Leslie, 2011; Loprinzi et al., 2015; Smith et al., 2014).

Shoot, we'd better hurry up and figure this out.
Streeter
Aging researchers

Betsy Streeter/CartoonStock

Exercise also stimulates brain cell development and neural connections, thanks perhaps to increased oxygen and nutrient flow (Erickson et al., 2013; Fleischman et al., 2015; Pereira et al., 2007). Sedentary older adults randomly assigned to aerobic exercise programs exhibit enhanced memory, sharpened judgment, and reduced risk of severe cognitive decline (Raji et al., 2016; Smith, 2016). In aging brains, exercise reduces brain shrinkage (Gow et al., 2012). It promotes neurogenesis (the birth of new nerve cells) in the hippocampus, a brain region important for memory formation (Erickson, 2009; Pereira et al., 2007). And it increases the cellular mitochondria that help power both muscles and brain cells (Steiner et al., 2011). We are more likely to rust from disuse than to wear out from overuse. Fit bodies support fit minds.

Cognitive Development

Aging and Memory

54-2 How does memory change with age?

Among the most intriguing developmental psychology questions is whether adult cognitive abilities, such as memory, intelligence, and creativity, parallel the gradually accelerating decline of physical abilities.

As we age, we remember some things well. Looking back in later life, adults asked to recall the one or two most important events over the last half-century tend to name events from their teens or twenties (Conway et al., 2005; Rubin et al., 1998). They also display this “reminiscence bump” when asked to name their all-time favorite music, movies, and athletes (Janssen et al., 2012). Whatever people experience around this time—the Vietnam war, the 9/11 terrorist attacks, the election of the first Black U.S. president—becomes pivotal (Pillemer, 1998; Schuman & Scott, 1989). Our teens and twenties hold so many memorable “firsts”—first kiss, first job, first day at college or university, first meeting our romantic partner’s parents.

AP® EXAM TIP

This section is a good example of the complexity of seemingly simple questions. It seems like one should be able to answer a question like “Does memory decline with age?” with a straightforward *yes* or *no*. People are complex. Development is complex. We should not be surprised to learn that many factors influence memory in adulthood.

Early adulthood is indeed a peak time for some types of learning and remembering. In one test of recall, people watched video clips as 14 strangers said their names, using a common format: “Hi, I’m Larry”

(Crook & West, 1990). Then those strangers reappeared and gave additional details. For example, they said, “I’m from Philadelphia,” providing more visual *and* voice cues for remembering the person’s name. As **Figure 54.2** shows, after a second and third replay of the introductions, everyone remembered more names, but younger adults consistently surpassed older adults. How well older people remember depends in part on the task. In another experiment, when asked to *recognize* 24 words they had earlier tried to memorize, older adults showed minimal memory decline. When asked to *recall* that information without clues, however, the decline was greater (**Figure 54.3**).

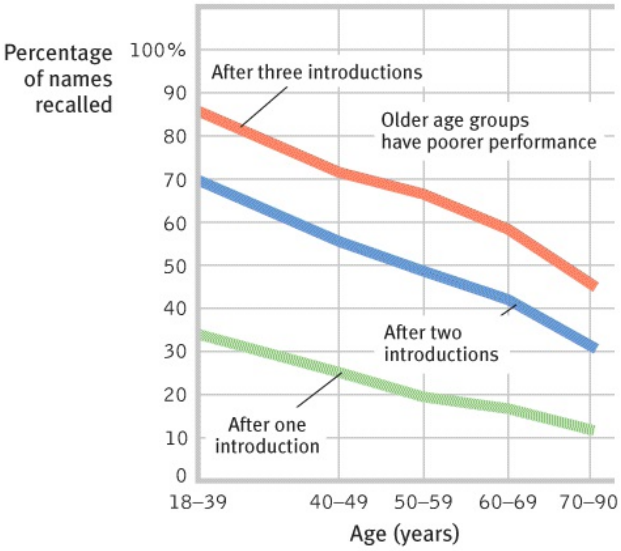

Figure 54.2
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Crook & West, 1990.

Figure 54.2 Tests of recall

Recalling new names introduced once, twice, or three times is easier for younger adults than for older ones.

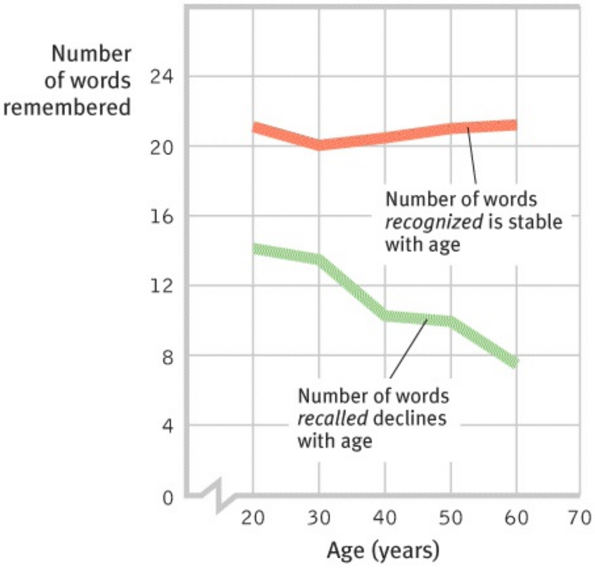

Figure 54.3
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Data from Schonfield & Robertson, 1966.

Figure 54.3 Recall and recognition in adulthood

In this experiment, the ability to *recall* new information declined during early and middle adulthood, but the ability to *recognize* new information did not.

Teens and young adults surpass both young children and 70-year-olds at *prospective memory* ("Remember to . . .") (Zimmermann & Meier, 2006). But older people's prospective memory remains strong when events help trigger a memory (as when walking by a convenience store triggers "Pick up milk!"). Time-based tasks ("Client meeting at 3:00 P.M.") and especially habitual tasks ("Take medications at 9:00 a.m., 2:00 P.M., and 6:00 P.M.") can be challenging (Einstein & McDaniel, 1990; Einstein et al., 1995, 1998). To minimize such problems, older adults rely more on time management and reminder cues, such as notes to themselves (Henry et al., 2004). This might have helped John Basinger, who, at age 76, memorized all 12 volumes of John Milton's epic poem *Paradise Lost* and became the subject of a psychology journal article (Seamon et al., 2010; Weir, 2010). A local paper scheduled an interview with Basinger, which he forgot to attend. Calling the reporter to apologize, he noted the irony of forgetting his interview about memory!

In our capacity to learn and remember, as in other areas of development, we show individual differences. Younger adults vary in their abilities to learn and remember, but 70-year-olds vary much more. “Differences between the most and least able 70-year-olds become much greater than between the most and least able 50-year-olds,” reported Oxford researcher Patrick Rabbitt (2006). Some 70-year-olds perform below nearly all 20-year-olds; other 70-year-olds match or outdo the average 20-year-old.

> “*I am still learning.*”
>
> *Michelangelo, 1560, at age 85*

No matter how quick or slow we are, remembering seems also to depend on the type of information we are trying to retrieve. If the information is meaningless—nonsense syllables or unimportant events—then the older we are, the more errors we are likely to make. If the information is *meaningful*, as was *Paradise Lost* for John Basinger, older people’s rich web of existing knowledge will help them to hold it. But they may take longer than younger adults to *produce* the words and things they know. Older adults also more often experience tip-of-the-tongue forgetting (Ossher et al., 2012). Quick-thinking game show winners have usually been young or middle-aged adults (Burke & Shafto, 2004).

TRY THIS

What experiences from your high school years do you think you may never forget? (These years, and the next few, will be among the times of your life you may remember most easily when you are 50.)

Maintaining Mental Abilities

Psychologists who study the aging mind debate whether “brain fitness” computer-based training programs can build mental muscles and stave off cognitive decline. Our brain remains plastic throughout life (Gutchess, 2014). So, can exercising our brains on a “cognitive treadmill”—with memory, visual tracking, and problem-solving exercises—avert losing our minds? “At every point in life, the brain’s natural plasticity gives us the ability to improve . . . function,” said one neuroscientist-entrepreneur (Merzenich, 2007). One analysis of cognitive training programs showed that they consistently improved scores on tests related to their training (Simons et al., 2016).

Based on such findings, some computer game makers have been marketing daily brain-exercise programs for older adults. But other researchers, after reviewing all the available studies, advise caution (Melby-Lervåg et al., 2016). One team of experts reported “extensive evidence that brain-training interventions improve performance on the trained tasks, less evidence that such interventions improve performance on closely related tasks, and little evidence that training enhances performance on distantly related tasks or that training improves everyday cognitive performance” (Simons et al., 2016, p. 103). As researcher Zach Hambrick (2014) explains, “Play a video game and you’ll get better at that video game, and maybe at very similar video games”—but not at driving a car or filling out your tax return.

In 2016, the maker of one prominent brain-training program, Lumosity, was fined $2 million for deceiving customers about the program’s supposed benefits. “Lumosity preyed on consumers’ fears about age-related cognitive decline,” said the Federal Trade Commission’s Jessica Rich (FTC, 2016). “But Lumosity simply did not have the science to back up its ads.”

Module 62 explores another dimension of cognitive development: intelligence. As we will see, **cross-sectional studies** (comparing people of different ages) and **longitudinal studies** (restudying the same people over time) have identified mental abilities that do and do not change as people age. Age is less a predictor of memory and intelligence than is proximity to death. Knowing whether someone is 8 months or 8 years from a natural death, regardless of age, gives a clue to that person’s mental ability. In the last three or four years of life and especially as death approaches, negative feelings and cognitive decline typically increase (Vogel et al., 2013; Wilson et al., 2007b). Researchers call this near-death drop *terminal* *decline* (Backman & MacDonald, 2006). Our goals also shift: We’re driven less to learn and more to connect socially (Carstensen, 2011).

cross-sectional study

research that compares people of different ages at the same point in time.

longitudinal study

research that follows and retests the same people over time.

> “*The sudden knowledge of the fragility of his life narrowed his focus and altered his desires.... It made him visit with his grandchildren more often, put in an extra trip to see his family in India, and tamp down new ventures.*”
>
> *Atul Gawande,* Being Mortal: Medicine and What Matters in the End, *2014, describing his father’s terminal condition and the way it changed his perspective*

Neurocognitive Disorders and Alzheimer’s Disease

54-3 How do neurocognitive disorders and Alzheimer’s disease affect cognitive ability?

Most people who live into their nineties do so with clear minds. Some, unfortunately, suffer substantial psychological decline that is *not* normal aging. Among older adults, hearing loss, and its associated social isolation, predicts risk of depression and accelerated mental decline (Lin et al., 2011a,b, 2013; Mick & Pichora-Fuller, 2016). Compared with people with good hearing, those with hearing loss show declines in memory, attention, and learning about three years earlier. A series of small strokes, a brain tumor, or alcohol use disorder can progressively damage the brain, causing that mental erosion we call a **neurocognitive disorder** (**NCD,** formerly called *dementia*). Heavy midlife smoking more than doubles later risk of the disorder (Rusanen et al., 2011). The feared brain ailment **Alzheimer’s disease** strikes 3 percent of the world’s population by age 75. Up to age

95, the incidence of mental disintegration doubles roughly every 5 years.

neurocognitive disorders (NCDs)

acquired (not lifelong) disorders marked by cognitive deficits; often related to Alzheimer’s disease, brain injury or disease, or substance abuse. In older adults, neurocognitive disorders were formerly called *dementia*.

Alzheimer’s disease

a neurocognitive disorder marked by neural plaques, often with onset after age 80, and entailing a progressive decline in memory and other cognitive abilities.

Alzheimer’s destroys even the brightest of minds. First memory deteriorates, then reasoning. (Occasionally forgetting where you laid the car keys is no cause for alarm; forgetting how to get home may suggest Alzheimer’s.) Robert Sayre (1979) recalled his father shouting at his afflicted mother to “think harder,” while his mother, confused, embarrassed, on the verge of tears, randomly searched the house for lost objects. As the disease runs its course, after 5 to 20 years, the person becomes emotionally flat, then disoriented and disinhibited, then incontinent, and finally mentally vacant—a sort of living death, a mere body stripped of its humanity.

Underlying the symptoms of Alzheimer’s are a loss of brain cells and a deterioration of neurons that produce the neurotransmitter acetylcholine, which is vital to memory and thinking. An autopsy reveals two telltale abnormalities in these acetylcholine-producing neurons: shriveled protein filaments in the cell body, and clumps of a free-floating protein fragment that accumulate as plaque at neuron tips where synaptic communication normally occurs. Long before symptoms appear, new technologies can now test for the Alzheimer’s susceptibility gene or check spinal fluid for the culprit protein fragments (De Meyer et al., 2010; Luciano et al., 2009). Such discoveries have stimulated a race to invent and test drugs that may forestall the disease, such as by reducing the activity of a memory-inhibiting neurotransmitter called GABA (Chen et al., 2014). The discovery of 21 associated genes may help (Lambert et al., 2013).

A diminishing sense of smell and slowed or wobbly walking foretell Alzheimer's (Belluck, 2012; Wilson et al., 2007a). In people at risk for Alzheimer's, brain scans (**Figure 54.4**) have also revealed—before symptoms appear—the degeneration of critical brain cells and diminished activity in Alzheimer's-related brain areas (Apostolova et al., 2006; Johnson et al., 2006; Wu & Small, 2006). When people memorized words, scans also showed diffuse brain activity, as if more exertion was required to achieve the same performance (Bookheimer et al., 2000).

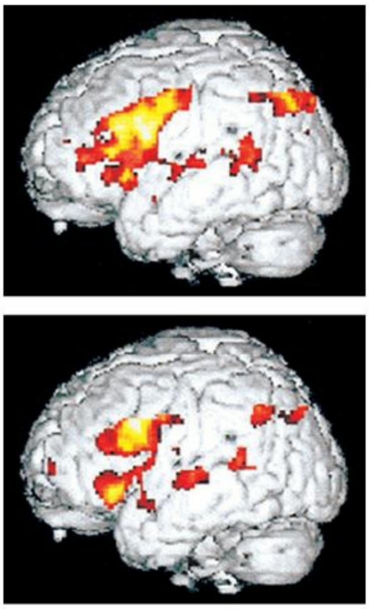


Figure 54.4
Susan Bookheimer

Figure 54.4 Predicting Alzheimer's disease

During a memory test, MRI scans of the brains of people at risk for Alzheimer's (top) revealed more intense activity (yellow, followed by orange and red) when compared with normal brains (bottom). As brain scans and genetic tests make it possible to identify those likely to suffer Alzheimer's, would you want to be tested? At what age?

Alzheimer's is somewhat less common among those who keep their minds and bodies active, through activities like reading, attending educational lectures, and running or lifting weights (Agrigoroaei & Lachman, 2011). As with muscles, so with the brain: Those who use it less often lose it.

Social Development

54-4 What themes and influences mark our social journey from early adulthood to death?

Many differences between younger and older adults are created by significant life events. A new job means new relationships, new expectations, and new demands. Marriage brings the joy of intimacy and the stress of merging two lives. The three years surrounding the birth of a child bring increased life satisfaction for most parents (Dyrdal & Lucas, 2011). The death of a loved one creates an irreplaceable loss. Do these adult life events shape a sequence of life changes?

Adulthood’s Ages and Stages

As people enter their forties, they undergo a transition to middle adulthood, a time when they realize that life will soon be mostly behind instead of ahead of them. Some psychologists have argued that for many the *midlife transition* is a crisis, a time of great struggle, regret, or even feeling struck down by life. The popular image of the midlife crisis—an early-forties man who forsakes his family for a younger romantic partner and a hot sports car—is more a myth than reality. Unhappiness, job dissatisfaction, marital dissatisfaction, divorce, anxiety, and suicide do *not* surge during the early forties (Hunter & Sundel, 1989; Mroczek & Kolarz, 1998). Divorce, for example, is most common among those in their twenties, suicide among those in their seventies and eighties. One study of emotional instability in nearly 10,000 men and women found “not the slightest evidence” that distress peaks anywhere in the midlife age range (McCrae & Costa, 1990).

For the 1 in 4 adults who report experiencing a life crisis, the trigger is not age, but a major event, such as illness, divorce, or job loss (Lachman, 2004). Some middle-aged adults describe themselves as a “sandwich generation,” simultaneously supporting their aging parents and their emerging adult children or grandchildren (Riley & Bowen, 2005).

Life events trigger transitions to new life stages at varying ages. The **social clock**—the definition of "the right time" to leave home, get a job, marry, have children, and retire—varies from era to era and culture to culture. The once-rigid sequence has loosened; the social clock still ticks, but people feel freer about being out of sync with it.

social clock

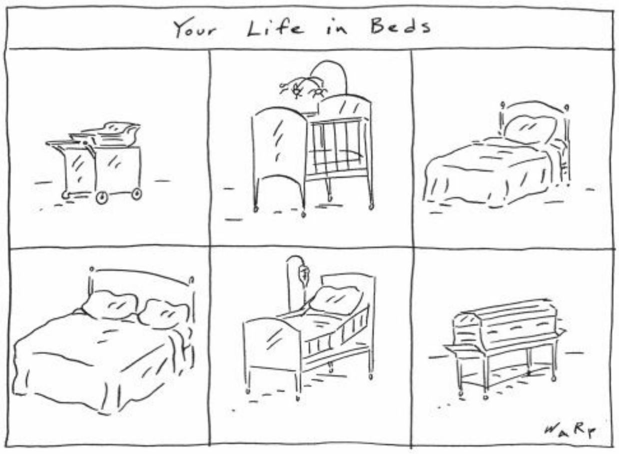
the culturally preferred timing of social events such as marriage, parenthood, and retirement.

> "*The important events of a person's life are the products of chains of highly improbable occurrences.*"
>
> *Joseph Traub, "Traub's Law," 2003*

Even *chance events* can have lasting significance, by deflecting us down one road rather than another. Albert Bandura (1982, 2005) recalls the ironic true story of a book editor who came to one of Bandura's lectures on the "Psychology of Chance Encounters and Life Paths"—and ended up marrying the woman who happened to sit next to him. The sequence that led to my [DM's] authoring this book (which was not my idea) began with my being seated near, and getting to know, a distinguished colleague at an international conference. The road to my [ND's] co-authoring this book began in a similarly unplanned manner: After stumbling on an article about my professional life, DM invited me to visit his college. There, we began a conversation that resulted in our collaboration. Chance events can change our lives.

Adulthood's Commitments

Two basic aspects of our lives dominate adulthood. Erik Erikson called them *intimacy* (forming close relationships) and *generativity* (being productive and supporting future generations). Sigmund Freud (1935/1960) put this more simply: The healthy adult, he said, is one who can *love* and *work.*



The New Yorker Collection, 2006, John Donohue from cartoonbank.com.
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Love

Blend Images/Alamy

Love Intimacy, attachment, commitment—love by whatever name—is central to healthy and happy adulthood.

We typically flirt, fall in love, and commit—one person at a time. “Pair-bonding is a trademark of the human animal,” observed anthropologist Helen Fisher (1993). From an evolutionary perspective, relatively monogamous pairing makes sense: Parents who cooperated to nurture their children to maturity were more likely to have their genes passed along to posterity than were parents who didn’t.

Adult bonds of love are most satisfying and enduring when marked by a similarity of interests and values, a sharing of emotional and material support, and intimate self-disclosure (see Module 79). There also appears to be “vow power.” Straight and gay relationships sealed with commitment more often endure (Balsam et al., 2008; Rosenfeld, 2014). Such bonds are especially likely to last when couples marry after age 20 and are well educated. Compared with their counterparts of 30 years ago, people in Western countries *are* better educated and marrying later (Wolfinger, 2015). These trends may help explain why the American divorce rate, which surged from 1960 to 1980, has since leveled off and even slightly declined in some areas (Schoen & Canudas-Romo, 2006). Canadian divorce rates since the 1980s have followed a similar pattern (Statistics Canada, 2011). Despite the drop in divorce, our standards have risen. We now hope not only for an enduring bond, but also for a mate who is a wage earner, caregiver, intimate friend, and warm and responsive lover (Finkel, 2017).

Historically, couples have met at school, on the job, or through friends and family. Thanks to the Internet, many couples now meet online—as have nearly a quarter of heterosexual couples and some two-thirds of same-sex couples in one recent national survey (**Figure 54.5**).

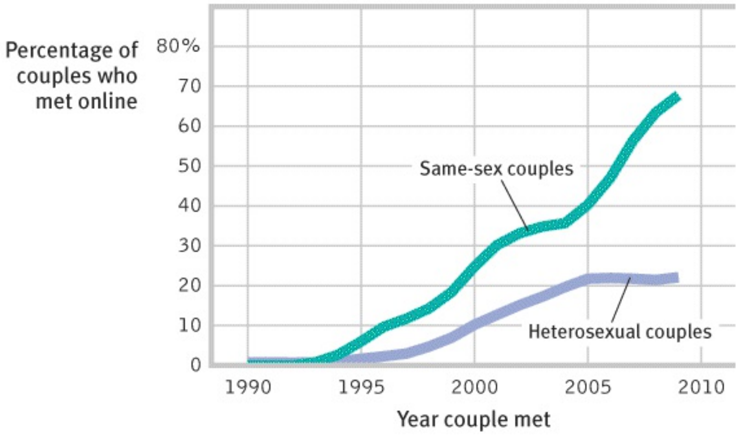

Figure 54.5
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Data from Rosenfeld, 2013; Rosenfeld & Thomas, 2012.

Figure 54.5 The changing way Americans meet their partners

A national survey of 2452 straight couples and 462 gay and lesbian couples reveals the increasing role of the Internet.

Might test-driving life together minimize divorce risk? In Europe, Canada, and the United States, those who live together before marriage (and especially before engagement) have had *higher* rates of divorce and marital dysfunction than those who did not (Goodwin et al., 2010; Jose et al., 2010; Manning & Cohen, 2012; Stanley et al., 2010). Three factors contribute. First, those who live together tend to be initially less committed to the ideal of enduring marriage. Second, they may become even less marriage-supporting while living together. Third, it’s more awkward to break up with a cohabiting partner than with a dating partner, leading some cohabiters to marry someone “they otherwise would have left behind” (Stanley & Rhoades, 2016a,b).

Although there is more variety in relationships today, the institution of marriage endures. Ninety-five percent of Americans have either married or want to (Newport & Wilke, 2013). In Western countries, people marry for love. What counts as a “very important” reason to marry? Among Americans, 31 percent say financial stability, and 93 percent say love (Cohn, 2013). And marriage is a predictor of happiness, sexual satisfaction, income, and physical and mental health (Scott et al., 2010). National Opinion Research Center surveys of more than 50,000 heterosexual Americans between 1972 and 2014 reveal that 40 percent of married adults, though only 23 percent of unmarried adults, have reported being “very happy.” Lesbian couples, too, have reported greater well-being than those who are single (Peplau & Fingerhut, 2007; Wayment & Peplau, 1995). Moreover, neighborhoods with high marriage rates typically have low rates of social pathologies such as crime, delinquency, and emotional disorders among children (Myers & Scanzoni, 2005).

TRY THIS

What do you think? Does marriage correlate with happiness because marital support and intimacy breed happiness, because happy people more often marry and stay married, or both?

Relationships that last are not always devoid of conflict. Some couples fight but also shower each other with affection. Other couples never raise their voices yet also seldom praise each other or nuzzle. Both styles can last. After observing the interactions of 2000 couples, John Gottman (1994) reported one indicator of marital success: at least a five-to-one ratio of positive to negative interactions. Stable marriages provide five times more instances of smiling, touching, complimenting, and laughing than of sarcasm, criticism, and insults. So, if you want to predict which couples will stay together, don't pay attention to how passionately they are in love. The pairs who make it are more often those who refrain from putting down their partners. To prevent a cancerous negativity, successful couples learn to fight fair (to state feelings without insulting) and to steer conflict away from chaos with comments like "I know it's not your fault" or "I'll just be quiet for a moment and listen."

> "*Our love for children is so unlike any other human emotion. I fell in love with my babies so quickly and profoundly, almost completely independently of their particular qualities. And yet 20 years later I was (more or less) happy to see them go—I had to be happy to see them go. We are totally devoted to them when they are little and yet the most we can expect in return when they grow up is that they regard us with bemused and tolerant affection.*"
>
> *Developmental psychologist Alison Gopnik, "The Supreme Infant," 2010*

Often, love bears children. For most people, this most enduring of life changes is a happy event—one that adds meaning, joy, and occasional stress (S. K. Nelson et al., 2013; Witters, 2014). "I feel an overwhelming love for my children unlike anything I feel for anyone else," said 93 percent of American mothers in a national survey (Erickson & Aird, 2005). Many fathers feel the same. A few weeks after the birth of my first child, I [DM] was suddenly struck by a realization: "So *this* is how my parents felt about me!"

When children begin to absorb time, money, and emotional energy, satisfaction with the relationship itself may decline (Doss et al., 2009). This is especially likely among employed women who, more than they expected, may also carry the burden of doing more chores at home. Putting effort into creating an equitable relationship can thus pay double dividends: greater satisfaction, which breeds better parent-child relations (Erel & Burman, 1995).

Although love bears children, children eventually leave home. This departure is a significant and sometimes difficult event. But for most people, an empty nest is a happy place (Adelmann et al., 1989; Gorchoff et al., 2008). Many parents experience a "postlaunch honeymoon," especially if they maintain close relationships with their children (White & Edwards, 1990). As Daniel Gilbert (2006) has said, "The only known symptom of 'empty nest syndrome' is increased smiling."

Work

Left: Hill Street Studios/Getty Images; Right: © Jose Luis Pelaez Inc/Blend Images/Corbis

Job satisfaction and life satisfaction Work can provide us with a sense of identity and competence, and opportunities for accomplishment. Perhaps this is why challenging and interesting occupations enhance people's happiness.

For many adults, the answer to "Who are you?" depends a great deal on the answer to "What do you do?" For women and men, choosing a career path is difficult, especially during bad economic times. Even in the best of times, few students in their first two years of college or university can predict their later careers.

FYI

For more on work, including discovering your own strengths, see Module 82, Psychology at Work.

In the end, happiness is about having work that fits your interests and provides you with a sense of competence and accomplishment. It is giving generously of your time and resources (Mogilner & Norton, 2016; Whillans et al., 2016). It is having a close, supportive companion, or family and friends, who notice and cheer your accomplishments (Campos et al., 2015). And for some, it includes having children who love you and whom you love and feel proud of.

Well-Being Across the Life Span

54-5 How does our well-being change across the life span?

To live is to grow older. This moment marks the oldest you have ever been and the youngest you will henceforth be. That means we all can look back with satisfaction or regret, and forward with hope or dread. When asked what they would have done differently if they could relive their lives, people's most common answer has been "taken my education more seriously and worked harder at it" (Kinnier & Metha, 1989; Roese & Summerville, 2005). Other regrets—"I should have told my father I loved him," "I regret that I never went to Europe"—have also focused less on mistakes made than on the things one *failed* to do (Gilovich & Medvec, 1995).

> “*When you were born, you cried and the world rejoiced. Live your life in a manner so that when you die the world cries and you rejoice.*”
>
> *Native American proverb*

From the teens to midlife, people typically experience a strengthening sense of identity, confidence, and self-esteem (Huang, 2010; Robins & Trzesniewski, 2005). In later life, challenges arise: Income shrinks, work opportunities go away, the body deteriorates, recall fades, energy wanes, family members and friends die or move away, and the great enemy, death, looms ever closer. Yet, a study revealed that compared with people who *imagine* what they would feel when facing death, those actually facing a terminal illness and imminent death are more positive and less despairing. In the researchers' words, "Dying is unexpectedly positive" (Goranson et al., 2017)

Moreover, the over-65 years are not notably unhappy. Gallup asked 658,038 people worldwide to rate their lives from 0 ("the worst possible life") to 10 ("the best possible life"). Age—from 15 to over 90 years—gave no clue to life satisfaction (Morrison et al., 2014). Self-esteem remains stable (Wagner et al., 2013). Positive feelings, supported by enhanced emotional control, tend to grow after midlife, and negative feelings subside (Stone et al., 2010; Urry & Gross, 2010). Compared with younger Chinese and American adults, for example, older adults are *more* attentive to positive news (Isaacowitz, 2012; Wang et al., 2015b).

Compared with teens and young adults, older adults do, however, tend to have a smaller social network, with fewer friendships and greater loneliness (Luhmann & Hawkley, 2016; Wagner et al., 2016). Like people of all ages, older adults are happiest when not alone (**Figure 54.6**). Older adults experience fewer problems in their relationships—less attachment anxiety, stress, and anger (Chopik et al., 2013; Fingerman & Charles, 2010; Stone et al., 2010). With age, we become more stable and more accepting (Carstensen et al., 2011; Shallcross et al., 2013).

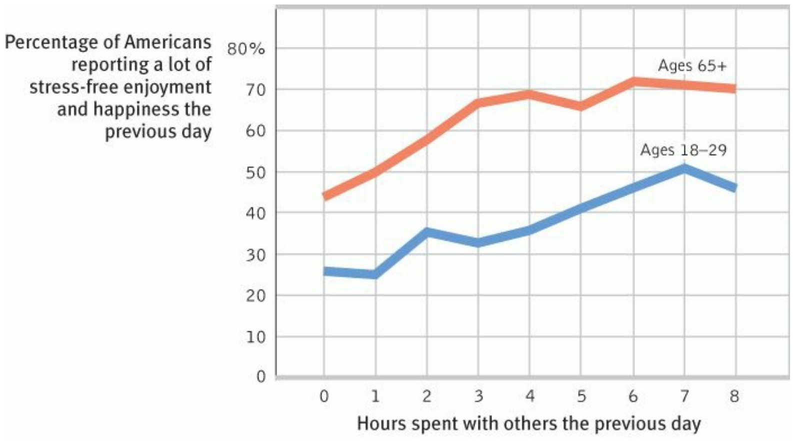

Figure 54.6
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Figure 54.6 Humans are social creatures

Both younger and older adults report greater happiness when spending time with others. (Note this correlation could also reflect happier people being more social.) (Gallup survey data reported by Crabtree, 2011.)

The aging brain may help nurture these positive feelings. Brain scans of older adults show that the amygdala, a neural processing center for emotions, responds less actively to negative events (but not to positive events) (Mather et al., 2004). Brain-wave reactions to negative images also diminish with age (Kisley et al., 2007). As we reach the later chapters of our lives, our brain enables a contented culmination (Mather, 2016).

Moreover, at all ages, the bad feelings we associate with negative events fade faster than do the good feelings we associate with positive events (Walker et al., 2003). This leaves most older people with the comforting feeling that life, on balance, has been mostly good. Thanks to biological, psychological, and social-cultural influences, more and more people flourish into later life (**Figure 54.7**).

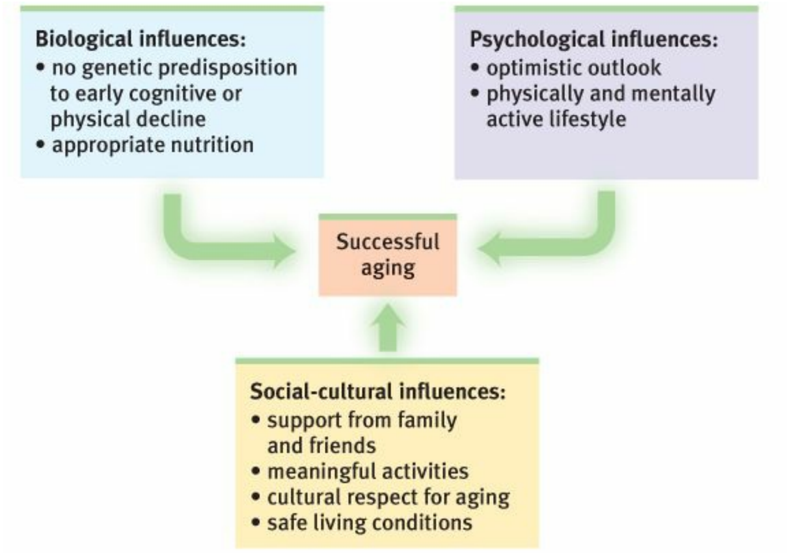

Biological influences:
• no genetic predisposition to early cognitive or physical decline
• appropriate nutrition
Psychological influences:
• optimistic outlook
• physically and mentally active lifestyle
Successful aging
Social-cultural influences:
• support from family and friends
• meaningful activities
• cultural respect for aging
• safe living conditions

Figure 54.7
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 54.7 **Biopsychosocial influences on successful aging**

The resilience of well-being across the life span obscures some interesting age-related emotional differences. When researchers mapped people's emotional terrain by periodically signaling them with electronic beepers to report their current activities and feelings, they found that teenagers typically come down from elation or up from gloom in less than an hour, but that adult moods are less extreme and more enduring (Csikszentmihalyi & Larson, 1984). As the years go by, feelings mellow (Brose et al., 2015). Highs become less high, lows less low. Compliments provoke less elation and criticisms less despair, as both become merely additional feedback atop a mountain of accumulated praise and blame. As we age, life therefore becomes less of an emotional roller coaster.

> “*At 20 we worry about what others think of us. At 40 we don’t care what others think of us. At 60 we discover they haven’t been thinking about us at all.*”
>
> *Anonymous*

> “*The best thing about being 100 is no peer pressure.*”
>
> *Lewis W. Kuester, 2005, on turning 100*

Death and Dying

54-6 A loved one’s death triggers what range of reactions?

Warning: If you begin reading the next paragraph, you will die.

> “*Love—why, I’ll tell you what love is: It’s you at 75 and her at 71, each of you listening for the other’s step in the next room, each afraid that a sudden silence, a sudden cry, could mean a lifetime’s talk is over.*”
>
> *Brian Moore,* The Luck of Ginger Coffey, *1960*

But of course, if you hadn’t read this, you would still die in due time. “Time is a great teacher,” noted the nineteenth-century composer Hector Berlioz, “but unfortunately it kills all its pupils.” Death is our inevitable end. We enter the world with a wail, and usually leave it in silence.

Most of us will also cope with the deaths of relatives and friends. For most people, the most difficult separation they will experience is the death of a partner—a loss suffered by four times more women than men.

Maintaining everyday engagements and relationships increases resilience in the face of such a loss (Infurna & Luthar, 2016). But for some, grief is severe, especially when a loved one’s death comes suddenly and before its expected time on the social clock. I [ND] experienced this firsthand when a tragic accident claimed the life of my 60-year-old mother. Such tragedies may trigger a year or more of memory-laden mourning that eventually subsides to a mild depression (Lehman et al., 1987).

For some, the loss is unbearable. One Danish long-term study of more than 1 million people found that about 17,000 of them had suffered the death of a child under 18. In the 5 years following that death, 3 percent of them had a first psychiatric hospitalization, a 67 percent higher rate than among other parents (Li et al., 2005).

Reactions to a loved one’s death range more widely than most suppose. Some cultures encourage public weeping and wailing; others hide grief. Within any culture, individuals differ. Given similar losses, some people grieve hard and long, others less so (Ott et al., 2007). Contrary to popular misconceptions, however:

- Terminally ill and bereaved people do not go through identical predictable stages, such as denial before anger (Friedman & James, 2008; Nolen-Hoeksema & Larson, 1999).
- Those who express the strongest grief immediately do not purge their grief more quickly (Bonanno & Kaltman, 1999; Wortman & Silver, 1989). But grieving parents who try to protect their partner by “staying strong” and not discussing their child’s death may actually prolong the grieving (Stroebe et al., 2013).
- Bereavement therapy and self-help groups offer support, but there is similar healing power in the passing of time, the support of friends, and the act of giving support and help to others (Baddeley & Singer, 2009; Brown et al., 2008; Neimeyer & Currier, 2009). Grieving spouses who talk often with others or receive grief counseling adjust about as well as those who grieve more privately (Bonanno, 2004; Stroebe et al., 2005).

> “*Consider, friend, as you pass by, as you are now, so once was I. As I am now, you too shall be. Prepare, therefore, to follow me.*”
>
> *Scottish tombstone epitaph*

Facing death with dignity and openness helps people complete the life cycle with a sense of life’s meaningfulness and unity—the sense that their existence has been good and that life and death are parts of an ongoing cycle. Although death may be unwelcome, life itself can be affirmed even at death. This is especially so for people who review their lives not with despair but with what Erik Erikson called a sense of *integrity*—a feeling that one’s life has been meaningful and worthwhile.

✓ Check Your Understanding

Ask Yourself

- In what ways are you looking forward to adulthood? What concerns do you have about your own transition into adulthood, and how do you think you might address them?

Test Yourself

- Freud defined the healthy adult as one who is able to ________________ and to ________________.
- What are some of the most significant challenges and rewards of growing old?
- Research has shown that living together before marriage predicts an increased likelihood of future divorce. What are some possible explanations for this correlation?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 54 REVIEW

54-1 What physical changes occur during middle and late adulthood?

- Muscular strength, reaction time, sensory abilities, and cardiac output begin to decline in the mid-twenties and continue to decline throughout middle and late adulthood.
- Women's period of fertility ends with *menopause* around age 50. Men experience a more gradual decline in fertility and sexual response.
- In late adulthood, the immune system weakens, increasing susceptibility to life-threatening illnesses.
- Chromosome tips (telomeres) wear down, reducing the chances of normal genetic replication.
- But for some, longevity-supporting genes, low stress, and good health habits enable better health in later life.

54-2 How does memory change with age?

- As the years pass, recall begins to decline, especially for meaningless information, but recognition memory remains strong.
- Developmental researchers study age-related changes (such as memory) with *cross-sectional studies* (comparing people of different ages) and *longitudinal studies* (retesting the same people over a period of years).
- "Terminal decline" describes the cognitive decline in the final few years of life.

54-3 How do neurocognitive disorders and Alzheimer's disease affect cognitive ability?

- Neurocognitive disorders (NCDs), formerly called *dementia* in older adults, are marked by cognitive deficits.

- Alzheimer’s disease causes the deterioration of memory, then reasoning. After 5 to 20 years, the person becomes emotionally flat, disoriented, disinhibited, incontinent, and finally mentally vacant.

54-4 What themes and influences mark our social journey from early adulthood to death?

- Adults do not progress through an orderly sequence of age-related social stages. Chance events can determine life choices.
- Evidence does not indicate that adults experience a “midlife crisis” or that distress peaks in midlife.
- The *social clock* is a culture’s preferred timing for social events, such as marriage, parenthood, and retirement.
- Adulthood’s dominant themes are love and work, which Erikson called intimacy and generativity.

54-5 How does our well-being change across the life span?

- Our self-confidence and sense of identity tends to strengthen across the life span.
- Surveys show that life satisfaction is unrelated to age. Positive emotions increase after midlife and negative ones decrease.
- As we age, we experience fewer extremes of emotion and mood.

54-6 A loved one’s death triggers what range of reactions?

- People do not grieve in predictable stages, as was once supposed.
- Strong expressions of emotion may not purge grief, and bereavement therapy is not significantly more effective than grieving without such aid.
- Erikson viewed the late-adulthood psychosocial task as developing a sense of integrity (versus despair).

Multiple-Choice Questions

1. Which of the following changes does *not* occur with age?

a. Visual sharpness diminishes.
b. Distance perception is less acute.
c. Adaptation to light-level changes is less rapid.
d. The lens of the eye becomes more transparent.
e. Senses of smell and hearing diminish.

2. As telomeres shorten, aging cells may die without being replaced with perfect genetic replicas. This process is slowed by

a. smoking.
b. obesity.
c. stress.
d. aging.
e. exercise.

3. Olivia and Jackson plan to get married next year. This significant life event will allow them to achieve Erikson's stage of

a. competence.
b. generativity.
c. intimacy.
d. identity.
e. integrity.

4. Brain scans of older adults show that the _________, a neural processing center for emotions, responds less actively to negative events (but not to positive events), and it interacts less with the hippocampus, a brain memory-processing center.

a. amygdala
b. hypothalamus
c. pineal gland
d. thyroid gland
e. thalamus

5. Which of the following is true of menopause?

a. Both men and women experience menopause around the age of 50.
b. Men experience menopause around 50 years of age, but women experience menopause around 65 years of age.
c. Women experience menopause around 50 years of age, but men experience menopause around 65 years of age.
d. Women experience menopause around the age of 50, but men don’t experience menopause.
e. Men experience menopause around the age of 65, but women don’t experience menopause.

6. Which of the following would be considered an example of Erikson’s concept of integrity?

a. A 25-year-old meets and marries the love of his life.
b. A 35-year-old earns a lot of money, though she doesn’t particularly enjoy her job.
c. An 85-year-old looks back at a life well-lived and feels satisfied.
d. A 40-year-old takes pride in her work and how she is raising her children.
e. A 20-year-old decides to become a physician.

Practice FRQs

1. Describe two ways in which cognitive ability declines during adulthood. Name one factor that can slow the decline.

Answer

1 point: There is a decline in recall—the ability to remember factual information—over the course of adulthood. Pages 561–562

1 point: There is a decline in speed of processing, such as the solving of a novel problem or reaction time, over the adult years. Pages 561–562

1 point: Exercise can help reduce cognitive decline. Page 561

2. Numerous biological, psychological, and social-cultural factors affect the way we age. Explain one example for each of the three that contributes to successful aging.

(3 points)

UNIT IX **REVIEW**

KEY TERMS AND CONCEPTS TO REMEMBER

developmental psychology, p. 486

zygote, p. 489

embryo, p. 489

fetus, p. 489

teratogens, p. 490

fetal alcohol syndrome (FAS), p. 490

habituation, p. 491

maturation, p. 494

cognition, p. 498

schema, p. 498

assimilation, p. 498

accommodation, p. 498

sensorimotor stage, p. 499

object permanence, p. 499

preoperational stage, p. 500

conservation, p. 501

egocentrism, p. 501

theory of mind, p. 501

concrete operational stage, p. 502

formal operational stage, p. 502

scaffold, p. 503

autism spectrum disorder (ASD), p. 505

stranger anxiety, p. 509

attachment, p. 509

critical period, p. 510

imprinting, p. 510

strange situation, p. 511
secure attachment, p. 511
insecure attachment, p. 511
temperament, p. 511
basic trust, p. 513
self-concept, p. 515
sex, p. 520
gender, p. 520
aggression, p. 521
relational aggression, p. 521
role, p. 525
gender role, p. 525
gender identity, p. 525
social learning theory, p. 525
gender typing, p. 525
androgyny, p. 526
transgender, p. 526
adolescence, p. 533
puberty, p. 533
identity, p. 539
social identity, p. 539
intimacy, p. 540
emerging adulthood, p. 542
X chromosome, p. 545
Y chromosome, p. 545
testosterone, p. 545
primary sex characteristics, p. 546
secondary sex characteristics, p. 546
spermarche [sper-MAR-key], p. 547
menarche [meh-NAR-key], p. 547
intersex, p. 547

AIDS (acquired immune deficiency syndrome), p. 547
sexual orientation, p. 549
menopause, p. 558
cross-sectional study, p. 563
longitudinal study, p. 563
neurocognitive disorders (NCDs), p. 563
Alzheimer's disease, p. 563
social clock, p. 565

KEY CONTRIBUTORS TO REMEMBER

Sigmund Freud, p. 487
Jean Piaget, p. 498
Lev Vygotsky, p. 503
Harry Harlow, p. 509
Margaret Harlow, p. 509
Konrad Lorenz, p. 510
Mary Ainsworth, p. 510
Erik Erikson, p. 513
Diana Baumrind, p. 516
Carol Gilligan, p. 522
Albert Bandura, p. 525
Lawrence Kohlberg, p. 535

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. What aspect of development did Jean Piaget's theory focus on?

a. Social
b. Moral
c. Cognitive

d. Physical
e. Ego

2. Jayden, age 15, is struggling with how his political views fit with those of his peers and his parents as he moves toward developing what Erikson would call his sense of

a. trust.
b. worth.
c. autonomy.
d. initiative.
e. identity.

3. What is the correct term for a period of time when certain events must take place in order to facilitate proper development?

a. Conservation stage
b. Preoperational stage
c. Attachment period
d. Critical period
e. Assimilation step

4. Which of the following statements about the impact of aging is *true?*

a. During old age, many of the brain's neurons die.
b. If we live to be 90 or older, most of us will eventually become senile.
c. Older people become less susceptible to short-term illnesses.
d. Recognition memory—the ability to identify things previously experienced—declines with age.
e. Life satisfaction peaks in the 50s and then gradually declines after age 65.

5. Kaylee contributes to the flood relief fund because others are doing so, and she doesn't want to look selfish. Kohlberg might explain that she is in the

a. postconventional stage.

b. preconventional stage.
c. conventional stage.
d. preoperational stage.
e. formal operational stage.

6. Mary Ainsworth's research on attachment suggests that a child is most likely to become "securely attached" when exposed to

a. a terry cloth-wrapped "surrogate" mother.
b. a caregiver with the right temperament.
c. consistent, responsive caregivers.
d. an imprinting experience shortly after birth.
e. enriched motor development experiences.

7. Temperament refers to what aspect of an infant's development?

a. Susceptibility to infection and disease
b. Emotional reactivity
c. General intelligence
d. Level of optimism
e. Ability to learn from situations

8. Which of these statements about intelligence and aging is true?

a. Older adults surpass younger adults at recalling information.
b. Older adults outperform teens at prospective memory.
c. There is less variability among 70-year-olds than among 20-year-olds in capacity to learn and remember.
d. When asked to recognize words, older adults show little memory decline.
e. Older adults are less likely than younger adults to make mistakes when remembering meaningless information.

9. Once a sperm penetrates the cell wall of an egg and fertilizes it, this structure is known as what?

a. An embryo
b. A fetus

c. Placenta
d. A teratogen
e. A zygote

0. Peyton is 11 years old and knows 10-7=3 and 3+7=10 but finds it difficult to solve a math problem, such as 3x-5, because she cannot understand why there is a letter in the problem. Piaget would most likely place her in the

a. concrete operational stage.
b. formal operational stage.
c. preoperational stage.
d. sensorimotor stage.
e. preconventional stage.

1. Most adolescents can ponder and debate human nature, good and evil, and truth and justice. According to Piaget, this thinking ability is due to the emergence of which stage?

a. Concrete operational
b. Sensorimotor
c. Preoperational
d. Formal operational
e. Accommodation

2. Mason retired at age 50 and was called “lucky” by his peers. This is because age 65 is the normal retirement age according to the

a. theory of mind.
b. midlife crisis.
c. critical period.
d. life span.
e. social clock.

3. The more often the stimulus is presented, the weaker the response becomes. What do developmental researchers call this decrease in response intensity due to repeated stimulation?

a. Stagnation
b. Attachment
c. Autonomy
d. Imprinting
e. Habituation

4. Ellie and Ella's parents set clear rules, but also have discussions with their daughters about the types of rules and what the consequences should be for breaking the rules. Their parents are evidently following the

a. authoritarian parenting style.
b. research of Harlow.
c. research of Bandura.
d. authoritative parenting style.
e. permissive parenting style.

5. Which of these is an example of a cross-sectional study?

a. The depth perception of infants is measured once a month for six months in a row, starting at age 6 months.
b. Researchers compare the reaction time of 20 sixth graders.
c. The memory of one group of 50-year-olds is measured and compared to a different group of 70-year-olds.
d. A psychologist develops a case study of a woman who is 102 by interviewing her twice a week for 12 weeks.
e. Researchers compare curiosity ratings of a group of toddlers with that same group's SAT scores 15 years later.

6. By providing increasingly difficult words for his second grader to spell, Logan is making use of

a. scaffolding.
b. assimilation.
c. accommodation.
d. imprinting.
e. maturation.

7. Ryan has a difficult time understanding his mother's facial expressions and engages in repetitive actions. One explanation of this is that Ryan is suffering from

a. FAS.
b. ASD.
c. NCD.
d. Metacognition.
e. menopause.

8. Researchers probing the brain in search of explanations for sexual orientation have found differences between homosexual men and heterosexual men in the region known as the

a. hippocampus.
b. amygdala.
c. frontal lobe.
d. medulla.
e. hypothalamus.

9. When she was 45, Sophie decided to go to nursing school because she felt that her corporate job was not fulfilling. Erikson would argue that her career change was an attempt to find a sense of

a. integrity.
b. intimacy.
c. generativity.
d. identity.
e. competence.

0. Studies indicating that self-esteem ratings fall during the early to mid-teen years find that

a. self-image rebounds in the late teens and twenties.
b. self-image does not rebound until age 30.
c. self-image rebounds in males by age 20 but not until age 30 for females.
d. males have higher rates of depression as teens.

e. females continue to have low self-image scores until age 40.

Free-Response Questions

1. Adolescence has been called a time of “storm and stress.” Describe how each of the following might contribute to this storm and stress.

- Limbic system activity
- Frontal lobe development
- Formal operational abilities
- Erikson’s identity versus role confusion stage
- Early physical maturation for girls

Rubric for Free Response Question 1

1 point: The limbic system is primed by surges of hormones at puberty, which may lead some adolescents to seek excitement and, possibly, behave impulsively. Page 534

1 point: The frontal lobes, which are necessary for judgment and planning, continue to develop during adolescence and into the early twenties. Unused pathways are pruned, and increasingly myelinated neurons speed the connection between the frontal lobes and other areas of the brain. Without completed frontal lobe development, adolescents are often unable to exert adult impulse control. They may be more likely to indulge in risky behaviors despite understanding the possible consequences. Page 534

1 point: When adolescents reach the formal operational stage, they have all of the cognitive abilities of earlier stages and can also think abstractly and hypothetically. With the ability to compare reality with a hypothetical ideal, adolescents may be disappointed in what exists, may detect hypocrisy, or may argue with those around them about how to achieve a more just world. Pages 502, 535

1 point: During Erikson’s identity versus role confusion stage, teenagers seek a sense of identity. Adolescents typically try out different versions of “self” before adopting a comfortable identity. This process can be difficult and can lead to conflicts with friends and family. Pages 539–540

1 point: Early maturation puts some girls out of sync with their emotional development and friends’ experiences. They may begin associating with older teens or endure teasing or sexual harassment. Page 534

2. Piaget, Erikson, and Kohlberg described several cognitive, social, and moral reasoning stages of adolescence. Explain each of the following stages.

- Concrete operational
- Formal operational
- Identity versus role confusion
- Intimacy versus isolation
- Conventional level
- Postconventional level

(6 points)

3. Cruz and Eva have a 7-year-old son. He is in the second grade and is extremely obedient. He has many friends, most of whom are on a baseball team with him.

What advice might each of the researchers give to Cruz and Eva about their son’s development?

- Jean Piaget (cognitive development)
- Harry and Margaret Harlow (attachment)
- Lawrence Kohlberg (levels of moral thinking)
- Erik Erikson (psychosocial development)
- Diana Baumrind (parenting styles)

(5 points)

UNIT X Personality

Melissa Medina/EyeEm/Getty Images

MODULES

55 Psychoanalytic and Psychodynamic Theories

56 Humanistic Theories

57 Trait Theories

58 Social-Cognitive Theories

59 Exploring the Self

Lady Gaga dazzles millions with her unique musical arrangements, tantalizing outfits, and provocative performances. In shows worldwide, Lady Gaga’s most predictable feature is her unpredictability. She has worn a meat dress to an award show, sported 16-inch heels to meet with U.S. President Barack Obama (who later described the interaction as “a little intimidating”), and inspired Super Bowl viewers with her halftime musical performance.

Yet even unpredictable Lady Gaga exhibits distinctive and enduring ways of thinking, feeling, and behaving. Her fans and critics alike can depend on her openness to new experiences and the energy she gets from the spotlight. And they can also rely on her painstaking dedication to her music and performances. She describes her high school self as “very dedicated, very studious, and very disciplined.” Now, in adulthood, she shows similar self-discipline: “I’m very detailed—every minute of the show has got to be perfect.” This unit focuses on the ways we all demonstrate unique and persistent patterns of thinking, feeling, and behaving—our *personality.*

Much of this book deals with personality. Other units consider biological influences on personality; personality development across the life span; how personality relates to learning, motivation, emotion, and health; social influences on personality, and disorders of personality. This unit focuses on personality itself—what it is and how researchers study it.

We begin with two historically important theories of personality that have become part of Western culture: Sigmund Freud’s *psychoanalytic theory* and the *humanistic* approach. These sweeping perspectives on human nature laid the foundation for later personality theorists and for what this unit presents next: newer scientific explorations of personality.

Today’s personality researchers study the basic dimensions of personality, and the interaction of persons and environments. They also study self-esteem, self-serving bias, and cultural influences on our concept of self—that sense of “Who I am.” And they study the unconscious mind—with findings that probably would have surprised even Freud.

▶ **Unit X Overview Video**

Module 55 Psychoanalytic and Psychodynamic Theories

LEARNING TARGETS

- 55-1 Explain what psychologists mean by *personality*, and identity the theories that inform our understanding of personality.
- 55-2 Explain how Sigmund Freud's treatment of psychological disorders led to his view of the unconscious mind, and describe his view of personality.
- 55-3 Identify the developmental stages Freud proposed, and discuss how he thought people defended themselves against anxiety.
- 55-4 Identify which of Freud's ideas his followers accepted and rejected.
- 55-5 Describe *projective tests* and how they are used, and discuss some criticisms of them.
- 55-6 Discuss how contemporary psychologists view Freud's psychoanalysis, and describe how modern research has developed our understanding of the unconscious.

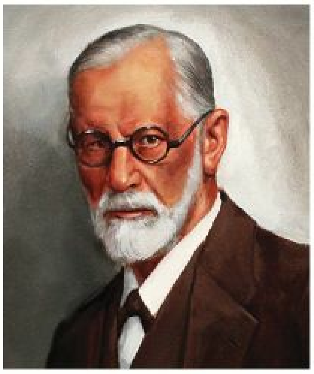
What Is Personality?

55-1 What is *personality*, and what theories inform our understanding of personality?

Psychologists have varied ways to view and study **personality**—our characteristic pattern of thinking, feeling, and acting. Sigmund Freud's *psychoanalytic theory* proposed that childhood sexuality and unconscious motivations influence personality. The *humanistic theories* focused on our inner capacities for growth and self-fulfillment. Later theorists built upon these two broad perspectives. *Trait theories* examine characteristic patterns of behavior *(traits*). *Social-cognitive theories* explore the interaction between people's traits (including their thinking) and their social context. Let's begin with psychodynamic theories.

Personality

an individual's characteristic pattern of thinking, feeling, and acting.



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Sigmund Freud (1856–1939) "I was the only worker in a new field."

Psychodynamic Theories

Psychodynamic theories of personality view human behavior as a dynamic interaction between the conscious mind and unconscious mind, including associated motives and conflicts. These theories are descended from Freud's **psychoanalysis**—his theory of personality and the associated treatment techniques. Freud's work is so famous that you may assume it's psychology's most important theory. It's not (other theories have more scientific support). However, Freud's focus on our unconscious mind has been followed by today's scientific studies of unconscious information processing.

psychodynamic theories

theories that view personality with a focus on the unconscious and the importance of childhood experiences.

psychoanalysis

Freud's theory of personality that attributes thoughts and actions to unconscious motives and conflicts; the techniques used in treating psychological disorders by seeking to expose and interpret unconscious tensions.

Freud's Psychoanalytic Perspective: Exploring the Unconscious

55-2 How did Sigmund Freud's treatment of psychological disorders lead to his view of the unconscious mind, and what was his view of personality?

Ask 100 people on the street to name a notable deceased psychologist, suggested Keith Stanovich (1996, p. 1), and "Freud would be the winner hands down." In the popular mind, he is to psychology what Elvis Presley is to rock music. Freud's influence lingers not only in psychiatry and clinical psychology, but also in literary and film interpretation. Freud's early twentieth-century concepts penetrate our twenty-first-century language. Without realizing their source, we may speak of *ego, repression, projection, complex* (as in "inferiority complex") *sibling rivalry, Freudian slips,* and *fixation.* So, who was Freud, and what did he teach?

Like all of us, Sigmund Freud was a product of his times. His late 1800s Victorian era was a time of tremendous discovery and scientific advancement, but also of sexual suppression and male dominance. Men's and women's roles were clearly defined, with male superiority assumed and only male sexuality generally acknowledged (discreetly). These assumptions influenced Freud's thinking about personality. He believed that psychological troubles resulted from men's and women's unresolved conflicts with their expected roles.

Long before entering the University of Vienna in 1873, young Freud showed signs of independence and brilliance. He so loved reading plays, poetry, and philosophy that he once ran up a bookstore debt beyond his means. As a teen, he often took his evening meal in his tiny bedroom in order to lose no time from his studies. After medical school he set up a private practice specializing in nervous disorders. Before long, however, he faced patients whose disorders made no neurological sense. A patient might have lost all feeling in a hand—yet there was no sensory nerve that, if damaged, would numb the entire hand and nothing else. Freud's search for a cause for such disorders set his mind running in a direction destined to change human self-understanding.

Do some neurological disorders have psychological causes? Freud's case studies led to his "discovery" of the **unconscious**. He speculated that lost feeling in one's hand might be caused by a fear of touching one's genitals; that unexplained blindness or deafness might be caused by not wanting to see or hear something that aroused intense anxiety. After some early unsuccessful trials with hypnosis, Freud turned to **free association**, in which he told the patient to relax and say whatever came to mind, no matter how embarrassing or trivial. He assumed that a line of mental dominoes had fallen from his patients' distant past to their troubled present. Free association, he believed, would allow him to retrace that line, following a chain of thought leading into the patient's unconscious. There, painful unconscious memories, often from childhood, could be retrieved, reviewed, and released.

unconscious

according to Freud, a reservoir of mostly unacceptable thoughts, wishes, feelings, and memories. According to contemporary psychologists, information processing of which we are unaware.

free association

in psychoanalysis, a method of exploring the unconscious in which the person relaxes and says whatever comes to mind, no matter how trivial or embarrassing.

Basic to Freud’s theory was his belief that the mind is mostly hidden (**Figure 55.1**). Our *conscious* awareness is like the part of an iceberg that floats above the surface. Beneath this awareness is the larger *unconscious* mind, with its thoughts, wishes, feelings, and memories. Some of these thoughts we store temporarily in a *preconscious* area, from which we can retrieve them into conscious awareness. Of greater interest to Freud was the mass of unacceptable passions and thoughts that he believed we *repress*, or forcibly block from our consciousness because they would be too unsettling to acknowledge. Freud believed that without our awareness, these troublesome feelings and ideas powerfully influence us, sometimes gaining expression in disguised forms—the work we choose, the beliefs we hold, our daily habits, our upsetting symptoms.

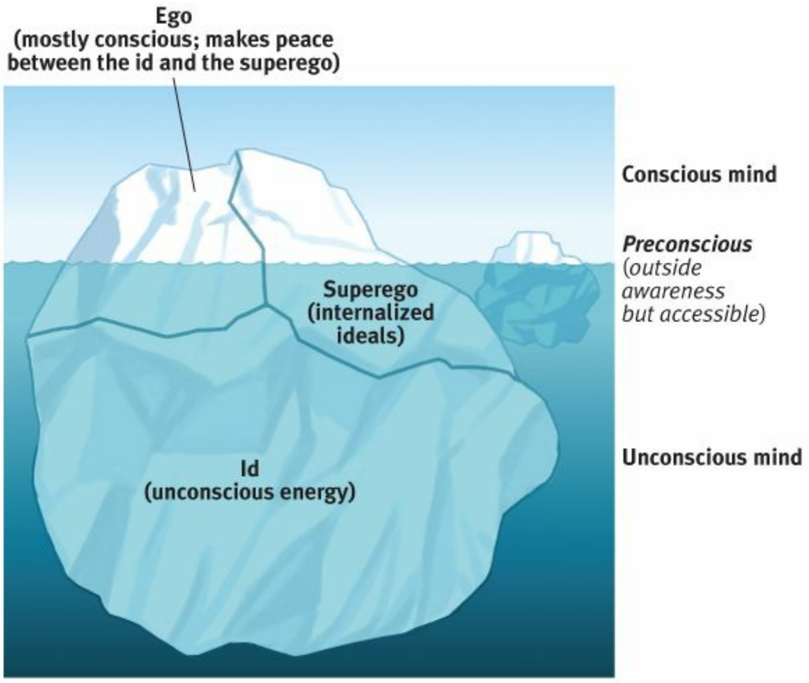
Ego
(mostly conscious; makes peace between the id and the superego)
Conscious mind
Preconscious
(outside awareness but accessible)
Superego
(internalized ideals)
Id
(unconscious energy)
Unconscious mind

Figure 55.1
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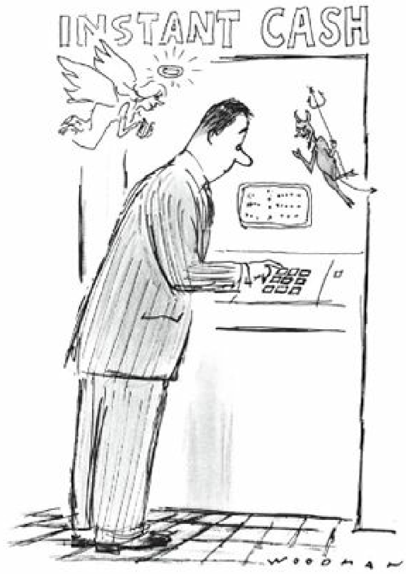
Figure 55.1 Freud's idea of the mind's structure

Psychologists have used an iceberg image to illustrate Freud's idea that the mind is mostly hidden beneath the conscious surface. Note that the id is totally unconscious, but ego and superego operate both consciously and unconsciously. Unlike the parts of a frozen iceberg, however, the id, ego, and superego interact.

AP® EXAM TIP

Be careful: It's easy to confuse Freud's three layers of the mind (conscious, preconscious, and unconscious) with the three parts of personality (the impulsive id, conscious ego, and restraining superego).



Bill Woodman The New Yorker Collection
/The Cartoon Bank

“Fifty is plenty.” “Hundred and fifty.”

The ego struggles to reconcile the demands of superego and id, said Freud.

Personality Structure

Freud believed that human personality, including its emotions and desires, arises from a conflict between impulse and restraint—between our aggressive, pleasure-seeking biological urges and our internalized social controls over these urges. Freud believed personality arises from our efforts to resolve this basic conflict—to express these impulses in ways that bring satisfaction without also bringing guilt or punishment. To understand the mind’s dynamics during this conflict, Freud proposed three interacting systems: the *id*, *ego*, and *superego* (Figure 55.1).

The **id’s** unconscious psychic energy constantly strives to satisfy basic drives to survive, reproduce, and aggress. The id operates on the *pleasure principle:* It seeks immediate gratification. To understand the id’s power, think of a newborn infant crying out for satisfaction, caring nothing for the outside world’s conditions and demands. Or think of people with a present rather than future time perspective—those predisposed to abuse tobacco, alcohol, or other drugs, who would rather party now than sacrifice today’s temporary pleasure for future success and happiness (Fernie et al., 2013; Friedel et al., 2014; Keough et al., 1999).

id

a reservoir of unconscious psychic energy that, according to Freud, strives to satisfy basic sexual and aggressive drives. The id operates on the *pleasure principle*, demanding immediate gratification.

As the **ego** develops, the young child responds to the real world. The ego, operating on the *reality principle*, seeks to gratify the id's impulses in realistic ways that will bring long-term pleasure. (Imagine what would happen if, lacking an ego, we acted on our unrestrained sexual or aggressive impulses.) The ego contains our partly conscious perceptions, thoughts, judgments, and memories.

ego

the largely conscious, "executive" part of personality that, according to Freud, mediates among the demands of the id, superego, and reality. The ego operates on the *reality principle*, satisfying the id's desires in ways that will realistically bring pleasure rather than pain.

Around age 4 or 5, Freud theorized, a child's ego recognizes the demands of the newly emerging **superego**, the voice of our moral compass (conscience) that forces the ego to consider not only the real but also the *ideal*. The superego focuses on how we *ought* to behave. It strives for perfection, judging actions and producing positive feelings of pride or negative feelings of guilt. Someone with an exceptionally strong superego may be virtuous yet guilt ridden; another with a weak superego may be outrageously self-indulgent and remorseless.

superego

the part of personality that, according to Freud, represents internalized ideals and provides standards for judgment (the conscience) and for future aspirations.

Because the superego's demands often oppose the id's, the ego struggles to reconcile the two. The ego is the personality "executive," mediating among the impulsive demands of the id, the restraining demands of the superego, and the real-life demands of the external world. If chaste Conner feels sexually attracted to Tatiana, his ego may satisfy both his id and superego by joining a volunteer organization that Tatiana attends regularly.

Personality Development

55-3 What developmental stages did Freud propose, and how did he think people defended themselves against anxiety?

Analysis of his patients' histories convinced Freud that personality forms during life's first few years. He concluded that children pass through a series of **psychosexual stages**, during which the id's pleasure-seeking energies focus on distinct pleasure-sensitive areas of the body called *erogenous zones* (**Table 55.1**). Each stage offers its own challenges, which Freud saw as conflicting tendencies.

FYI

Erogenous comes from the Greek "eros" (sexual desire) + "genous" (producing); pronounced eh-ROJ-uh-nuss.

psychosexual stages

the childhood stages of development (oral, anal, phallic, latency, genital) during which, according to Freud, the id's pleasure-seeking energies focus on distinct erogenous zones.

TABLE 55.1 Freud's Psychosexual Stages

Stage	Focus

Oral (0–18 months)	Pleasure centers on the mouth—sucking, biting, chewing
Anal (18–36 months)	Pleasure focuses on bowel and bladder elimination; coping with demands for control
Phallic (3–6 years)	Pleasure zone is the genitals; coping with incestuous sexual feelings
Latency (6 to puberty)	A phase of dormant sexual feelings
Genital (puberty on)	Maturation of sexual interests

Freud believed that during the *phallic stage,* for example, boys develop both unconscious sexual desires for their mother and jealousy and hatred for their father, whom they consider a rival. These feelings, he thought, lead boys to feel guilty and to fear punishment, perhaps by castration, from their father. Such was Freud’s (1897) own experience: “I found [myself . . .] in love with my mother and jealous of my father, and I now consider it a universal event in early childhood.” He called this collection of feelings the **Oedipus complex** after the Greek legend of Oedipus, who unknowingly killed his father and married his mother. Some psychoanalysts in Freud’s era believed that girls experience a parallel *Electra complex* (named after a mythological plotting daughter).

Oedipus [ED-uh-puss] complex

according to Freud, a boy’s sexual desires toward his mother and feelings of jealousy and hatred for the rival father.

Children eventually cope with the threatening feelings, said Freud, by repressing them and by identifying with (trying to become like) the rival parent. It’s as though something inside the child decides, “If you can’t beat ’em [the same-sex parent], join ’em.” Through this **identification** process, children’s superegos gain strength as they incorporate many of their parents' values. Freud believed that identification with the same-sex parent provided what psychologists now call our *gender identity*—our sense of being male, female, or some combination of the two. Freud presumed that our early childhood relations—especially with our parents and other caregivers—influence our developing identity, personality, and frailties.

identification

the process by which, according to Freud, children incorporate their parents' values into their developing superegos.

In Freud's view, conflicts unresolved during earlier psychosexual stages could surface as maladaptive behavior in the adult years. At any point in the oral, anal, or phallic stages, strong conflict could lock, or **fixate**, the person's pleasure-seeking energies in that stage. A person who had been either orally overindulged or deprived (perhaps by abrupt, early weaning) might fixate at the oral stage. This orally fixated adult could exhibit either passive dependence (like that of a nursing infant) or an exaggerated denial of this dependence (by acting tough or uttering biting sarcasm). Or the person might continue to seek oral gratification by smoking or excessive eating. In such ways, Freud suggested, the twig of personality is bent at an early age.

fixation

in psychoanalytic theory, according to Freud, a lingering focus of pleasure-seeking energies at an earlier psychosexual stage, in which conflicts were unresolved.

Charles Saxon The New Yorker Collection
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“Oh for goodness’ sake, smoke!”

Defense Mechanisms

Anxiety, said Freud, is the price we pay for civilization. As members of social groups, we must control our sexual and aggressive impulses, not act them out. But sometimes the ego fears losing control of this inner id–superego war. The presumed result is a dark cloud of unfocused anxiety that leaves us feeling unsettled but unsure why.

Freud proposed that the ego protects itself with **defense mechanisms**—tactics that reduce or redirect anxiety by distorting reality (**Table 55.2**). For Freud, *all defense mechanisms function indirectly and unconsciously*. Just as the body unconsciously defends itself against disease, so also does the ego unconsciously defend itself against anxiety. For example, **repression** banishes anxiety-arousing wishes and feelings from consciousness. According to Freud, *repression underlies all the other defense mechanisms*. However, because repression is often incomplete, repressed urges may appear as symbols in dreams or as slips of the tongue in casual conversation.

defense mechanisms

in psychoanalytic theory, the ego’s protective methods of reducing anxiety by unconsciously distorting reality.

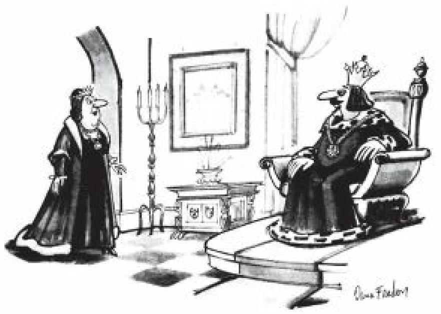
repression

in psychoanalytic theory, the basic defense mechanism that banishes from consciousness anxiety-arousing thoughts, feelings, and memories.

TABLE 55.2 Seven Defense Mechanisms Freud believed that *repression*, the basic mechanism that banishes anxiety-arousing impulses, enables other defense mechanisms, seven of which are listed here as ways a high school student might respond to being cut from the soccer team.

Defense Mechanism	Unconscious Process Employed to Avoid Anxiety-Arousing Thoughts or Feelings	Example of How a 16-Year-Old Defends Against Anxiety After Being Cut from the Soccer Team
Regression	Retreating to an earlier psychosexual stage, where some psychic energy remains fixated	Wants to go to his grandma's house to play cards and eat her chocolate chip cookies
Reaction formation	Switching unacceptable impulses into their opposites	Makes a big show of expressing indifference about being on "the stupid soccer team"
Projection	Disguising one's own threatening impulses by attributing them to others	Talks a lot about how mad his parent is at the coach
Rationalization	Offering self-justifying explanations in place of the real, more threatening unconscious reasons for one's actions	Explains that he wasn't working very hard in the tryouts and could have made the team if he really wanted to
Displacement	Shifting sexual or aggressive impulses toward a more acceptable or less threatening object or person	Yells at his little brother for no real reason
Sublimation	Transferring of unacceptable impulses into socially valued	Decides instead to join the cross-country running team,

	motives	where all are accepted
Denial	Refusing to believe or even perceive painful realities	Insists that there was an error on the team list and he’s going to set things right with the coach



Dana Fradon The New Yorker Collection /The Cartoon Bank

“Good morning, beheaded—uh, I mean beloved.”

Freud believed he could glimpse the unconscious seeping through what we today call “Freudian slips”—as when a financially stressed patient, not wanting any large pills, said, “Please do not give me any bills, because I cannot swallow them.” Freud also viewed jokes as expressions of repressed sexual and aggressive tendencies, and dreams as the “royal road to the unconscious.” The remembered content of dreams (their *manifest content*) he believed to be a censored expression of the dreamer’s unconscious wishes (the dream’s *latent content*). In his dream analyses, Freud searched for patients’ inner conflicts.

> “*I remember your name perfectly but I just can’t think of your face.*”
>
> *Oxford professor W. A. Spooner (1844–1930), famous for his linguistic flip-flops (spoonerisms). Spooner rebuked one student for “fighting a liar in the quadrangle” and another who “hissed my mystery lecture,” adding “You have tasted two worms.”*

AP® EXAM TIP

The differences between these defense mechanisms aren’t always clear. For example, *repression* can be found in most examples. Focus on each example’s key feature. If the key feature is seeing your own impulse in someone else, it’s projection. If the key feature is shifting your aggression from one target to another, it’s displacement.

Left: VStock/Alamy; Right: Richard I’Anson/Getty Images

Regression Faced with a mild stressor, children and young orangutans seek protection and comfort from their caregivers. Freud might have interpreted these behaviors as regression, a retreat to an earlier developmental stage.

✓ Check Your Understanding

Ask Yourself

- Which of Freud’s presumed defense mechanisms have you found yourself employing?

Test Yourself

- According to Freud’s ideas about the three-part personality structure, the _______________ operates on the *reality principle* and tries to balance demands in a way that produces long-term pleasure rather than pain, the _______________ operates on the *pleasure principle* and seeks immediate gratification, and the _______________ represents the voice of our internalized ideals (our *conscience*).
- In the psychoanalytic view, conflicts unresolved during one of the psychosexual stages may lead to _______________ at that stage.
- Freud believed that our defense mechanisms operate _______________ (consciously/unconsciously) and defend us against _______________.

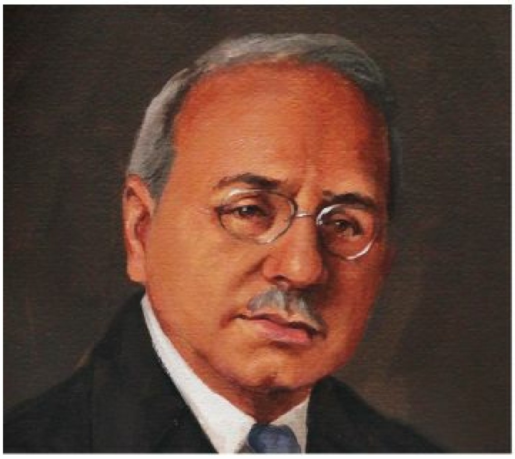
Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

The Neo-Freudian and Later Psychodynamic Theorists

55-4 Which of Freud’s ideas did his followers accept or reject?

In a historical period when people rarely talked about sex, and certainly not unconscious desires for sex with one’s parent, Freud’s writings sparked intense debate. “In the Middle Ages, they would have burned me,” observed Freud to a friend. “Now they are content with burning my books” (Jones, 1957). Despite the controversy, Freud attracted followers. Several young, ambitious physicians formed an inner circle around their strong-minded leader. These pioneering psychoanalysts, whom we often call *neo-Freudians*, adopted Freud’s interviewing techniques and accepted his basic ideas: the personality structures of id, ego, and superego; the importance of the unconscious; the childhood roots of personality; and the dynamics of anxiety and the defense mechanisms. But they broke off from Freud in two important ways. First, they placed more emphasis on the conscious mind’s role in interpreting experience and in coping with the environment. And second, they doubted that sex and aggression were all-consuming motivations. Instead, they tended to emphasize loftier motives and social interactions.

Alfred Adler and Karen Horney [HORN-eye], for example, agreed with Freud that childhood is important. But they believed that childhood *social*, not sexual, tensions are crucial for personality formation (Ferguson, 2003, 2015). Adler (who gave us the still popular *inferiority complex* idea) had struggled to overcome childhood illnesses and accidents. He believed that much of our behavior is driven by efforts to conquer childhood inferiority feelings that trigger our strivings for superiority and power. Horney said childhood anxiety triggers our desire for love and security. She also opposed Freud’s assumptions that women have weak superegos and suffer “penis envy,” and she attempted to balance his masculine bias.



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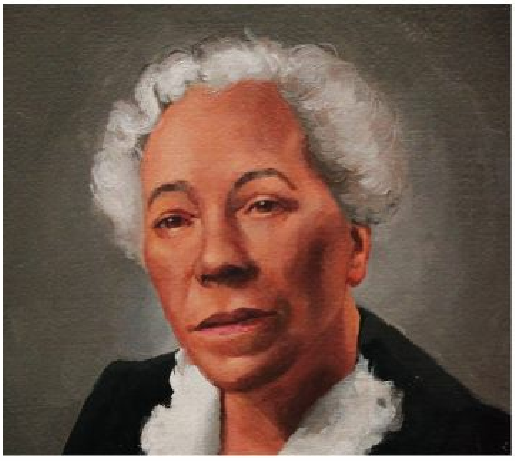
Alfred Adler “The individual feels at home in life and feels his existence to be worthwhile just so far as he is useful to others and is overcoming feelings of inferiority” (*Problems of Neurosis*, 1964).



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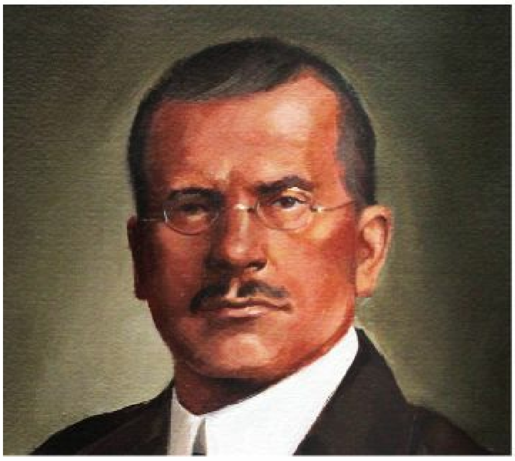
Karen Horney “The view that women are infantile and emotional creatures, and as such, incapable of responsibility and independence is the work of the masculine tendency to lower women’s self-respect” (*Feminine Psychology*, 1932).

Carl Jung [Yoong], Freud’s disciple-turned-dissenter, placed less emphasis on social factors and agreed with Freud that the unconscious exerts a powerful influence. But to Jung, the unconscious contains more than our repressed thoughts and feelings. He believed we also have a **collective unconscious**, a common reservoir of images, or *archetypes*, derived from our species’ universal experiences. Jung said that the collective unconscious explains why, for many people, spiritual concerns are deeply rooted and why people in different cultures share certain myths and images. Most of today's psychologists discount the idea of inherited experiences. But they do believe that our shared evolutionary history shaped some universal dispositions, and that experience can leave *epigenetic* marks affecting gene expression (see Module 14).



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Carl Jung "From the living fountain of instinct flows everything that is creative; hence the unconscious is the very source of the creative impulse" (*The Structure and Dynamics of the Psyche*, 1960).

collective unconscious

Carl Jung's concept of a shared, inherited reservoir of memory traces from our species' history.

Freud died in 1939. Since then, some of his ideas have been incorporated into the diverse perspectives that make up modern psychodynamic theory. "Most contemporary [psychodynamic] theorists and therapists are not wedded to the idea that sex is the basis of personality," noted Drew Westen (1996). They "do not talk about ids and egos, and do not go around classifying their patients as oral, anal, or phallic characters." What they do assume, with Freud and with much support from today's psychological science, is that much of our mental life is unconscious. With Freud, they also assume that we often struggle with inner conflicts among our wishes, fears, and values, and that childhood shapes our personality and ways of becoming attached to others.

Assessing Unconscious Processes

Flip It Video: Projective Tests

55-5 What are *projective tests*, how are they used, and what are some criticisms of them?

Personality tests reflect the basic ideas of particular personality theories. So, what might be the assessment tool of choice for someone working in the Freudian tradition?

Such a test would need to provide some sort of road into the unconscious—to unearth the residue of early childhood experiences, move beneath surface thoughts, and reveal hidden conflicts and impulses. Objective assessment tools, such as agree-disagree or true-false questionnaires, would be inadequate because they would merely tap the conscious surface.

Projective tests aim to provide this "psychological X-ray" by asking test-takers to describe an ambiguous image or tell a story about it. The clinician may presume that any hopes, desires, and fears that people see in the ambiguous image are projections of their own inner feelings or conflicts.

projective test

a personality test, such as the Rorschach, that provides ambiguous images designed to trigger projection of one's inner dynamics.

Henry Murray (1933) demonstrated a possible basis for such a test at a party hosted by his 11-year-old daughter. Murray engaged the children in a frightening game called "Murder." When shown some photographs after the game, the children perceived the photos as more malicious than they had before the game. These children, it seemed to Murray, had *projected* their inner feelings into the pictures.

A few years later, Murray introduced the **Thematic Apperception Test (TAT)**—a test in which people view ambiguous pictures and then make up stories about them (**Figure 55.2**). Shown a daydreaming boy, those who imagine he is fantasizing about an achievement are presumed to be projecting their own goals. “As a rule,” said Murray, “the subject leaves the test happily unaware that he has presented the psychologist with what amounts to an X-ray of his inner self” (quoted by Talbot, 1999).

Thematic Apperception Test (TAT)

a projective test in which people express their inner feelings and interests through the stories they make up about ambiguous scenes.

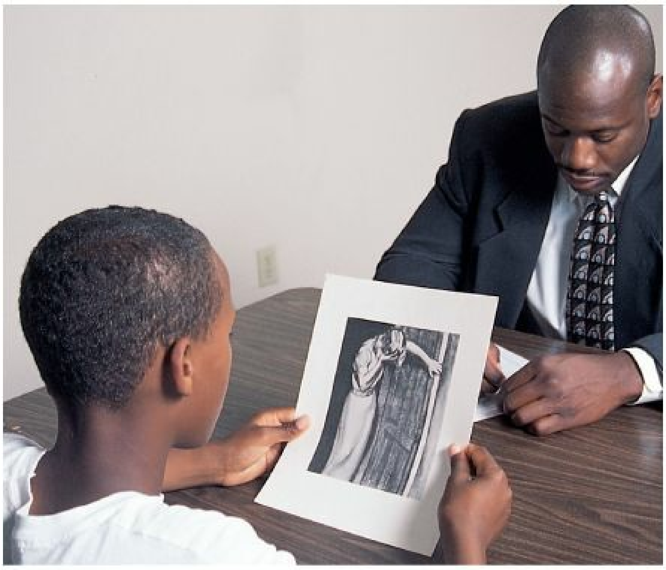


Figure 55.2
Lewis J. Merrim/Science Source

Figure 55.2 **The TAT**

This clinician presumes that the hopes, fears, and interests expressed in this boy’s descriptions of a series of ambiguous pictures in the Thematic Apperception Test (TAT) are projections of his inner feelings.

Numerous studies suggest that Murray was right: The TAT provides a valid and reliable map of people’s implicit motives. For example, such storytelling has been used to assess *achievement* and *affiliation motivation* (Drescher & Schultheiss, 2016; Schultheiss et al., 2014). TAT responses also show consistency over time (Lundy, 1985; Schultheiss & Pang, 2007).

Show people a picture today, and they'll imagine a story similar to one they will tell when, a month later, they see the same picture.

Swiss psychiatrist Hermann Rorschach [ROAR-shock; 1884–1922] created the most widely used projective test. He based his famous **Rorschach inkblot test**, in which people describe what they see in a series of inkblots (**Figure 55.3**), on a childhood game. He and his friends would drip ink on a paper, fold it, and then say what they saw in the resulting blot (Sdorow, 2005). Do you see predatory animals or weapons? Perhaps you have aggressive tendencies. But is this a reasonable assumption? The answer varies.

Rorschach inkblot test

the most widely used projective test; a set of 10 inkblots, designed by Hermann Rorschach; seeks to identify people's inner feelings by analyzing their interpretations of the blots.

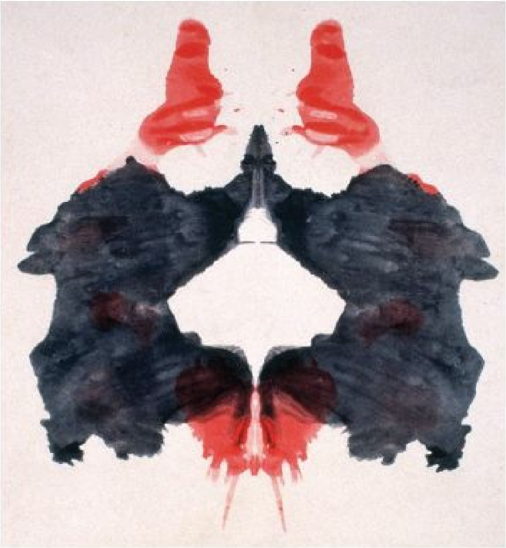


Figure 55.3
Spencer Grant/Science Source

Figure 55.3 The Rorschach test

In this projective test, people tell what they see in a series of symmetrical inkblots. Some who use this test are confident that the interpretation of ambiguous images will reveal unconscious aspects of the test-taker's personality.

Some clinicians cherish the Rorschach test, even offering Rorschach-based assessments of criminals’ violence potential. Others view the test as a source of suggestive leads, an icebreaker, or a revealing interview technique. The Society for Personality Assessment (2005) commends the test’s “responsible use” when “appropriate and justified” (which would *not* include, for example, using the test to infer past childhood sexual abuse).

> “ *We don’t see things as they are; we see things as we are.* ”
>
> *The Talmud*

But the evidence does not persuade its revilers, who insist the Rorschach is no emotional MRI. They argue that only a few of the many Rorschach-derived scores, such as those for cognitive impairment and thought disorder, have demonstrated reliability and validity (Mihura et al., 2013, 2015; Wood et al., 2015). And inkblot assessments have inaccurately diagnosed many healthy adults as pathological (Wood, 2003; Wood et al., 2006). “Even seasoned professionals can be fooled by their intuitions and their faith in tools that lack strong evidence of effectiveness,” warned Scott Lilienfeld, James Wood, and Howard Garb (2001, p. 47). “When a substantial body of research demonstrates that old intuitions are wrong, it is time to adopt new ways of thinking.”

> “ *The Rorschach [inkblot test] has the dubious distinction of being, simultaneously, the most cherished and the most reviled of all psychological assessment tools.* ”
>
> *John Hunsley and J. Michael Bailey (1999)*

Evaluating Freud’s Psychoanalytic Perspective and Modern Views of the Unconscious

55-6 How do contemporary psychologists view Freud’s psychoanalysis, and how has modern research developed our understanding of the unconscious?

Modern Research Contradicts Many of Freud’s Ideas

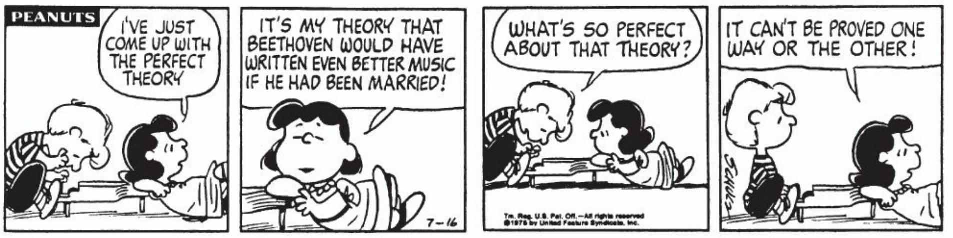
We critique Freud from a twenty-first-century perspective. Freud did not have access to neurotransmitter or DNA studies, or to all that we have since learned about human development, thinking, and emotion. To criticize his theory by comparing it with today’s thinking is like criticizing Ford’s Model T by comparing it with Tesla’s Model S. How tempting it is to judge the past from the perspective of our present.

> “*Many aspects of Freudian theory are indeed out of date, and they should be: Freud died in 1939, and he has been slow to undertake further revisions.*”
>
> *Psychologist Drew Westen (1998)*

Nevertheless, both Freud’s devotees and his detractors agree that recent research contradicts many of his specific ideas. Today’s developmental psychologists see our *development as lifelong*, not fixed in childhood. They doubt that infants’ neural networks are mature enough to sustain as much emotional trauma as Freud assumed. Some think Freud overestimated parental influence and underestimated peer influence. They also doubt that conscience and gender identity form as the child resolves the Oedipus complex at age 5 or 6. We gain our gender identity earlier, and those who become strongly masculine or feminine do so even without a same-sex parent present. And they note that Freud’s ideas about childhood sexuality arose from stories of childhood sexual abuse told by his female patients—stories that some scholars believe Freud doubted and attributed to his patients’ own childhood sexual wishes and conflicts

(Esterson, 2001; Powell & Boer, 1994). Today, we know that *childhood sexual abuse happens*, and we also understand how Freud's questioning might have created false memories of abuse.

As we saw in Module 24, modern dream research disputes Freud's belief that dreams disguise and fulfill wishes. And slips of the tongue can be explained as competition between similar verbal choices in our memory network. Someone who says "I don't want to do that—it's a lot of brothel" may simply be blending *bother* and *trouble* (Foss & Hakes, 1978). Researchers find little support for Freud's idea that defense mechanisms disguise sexual and aggressive impulses (though our cognitive gymnastics do indeed work to protect our self-esteem). History also has failed to support another of Freud's ideas—that suppressed sexuality causes psychological disorders. From Freud's time to ours, sexual inhibition has diminished; psychological disorders have not.


PEANUTS
I'VE JUST COME UP WITH THE PERFECT THEORY
IT'S MY THEORY THAT BEETHOVEN WOULD HAVE WRITTEN EVEN BETTER MUSIC IF HE HAD BEEN MARRIED!
7-16
WHAT'S SO PERFECT ABOUT THAT THEORY?
IT CAN'T BE PROVED ONE WAY OR THE OTHER!
SCHULZ

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Psychologists further criticize Freud's theory for its scientific shortcomings. Recall from Module 5 that good scientific theories explain observations and offer testable hypotheses. Freud's theory rests on few objective observations, and parts of it offer few testable hypotheses. For Freud, his own recollections and interpretations of patients' free associations, dreams, and slips—sometimes selected to support his theory—were evidence enough.

What is the most serious problem with Freud's theory? It offers after-the-fact explanations of any characteristic (of one person's smoking, another's fear of horses, another's sexual orientation), yet fails to *predict* such behaviors and traits. If you feel angry at your mother's death, you illustrate Freud's theory because "your unresolved childhood dependency needs are threatened." If you do not feel angry, you again illustrate his theory because “you are repressing your anger.” That “is like betting on a horse after the race has been run” (Hall & Lindzey, 1978, p. 68). A good theory makes testable predictions.

> “*We are arguing like a man who should say, ‘If there were an invisible cat in that chair, the chair would look empty; but the chair does look empty; therefore there is an invisible cat in it’.*”
>
> *C. S. Lewis,* Four Loves, *1958*

So, should psychology post an “Allow Natural Death” order on this old theory? Freud’s supporters object. To criticize Freudian theory for not making testable predictions is, they say, like criticizing baseball for not being an aerobic exercise—something it was never intended to be. Freud never claimed that psychoanalysis was predictive science. He merely claimed that, looking back, psychoanalysts could find meaning in our state of mind (Rieff, 1979).

Freud’s supporters also note that some of his ideas *are* enduring. It was Freud who drew our attention to the unconscious and the irrational, at a time when such ideas were not popular. Today, many researchers study our irrationality (Ariely, 2010; Thaler, 2015). Psychologist Daniel Kahneman won a 2002 Nobel Prize for his studies of our faulty decision making. Freud also drew our attention to the importance of human sexuality, and to the tension between our biological impulses and our social well-being. It was Freud who challenged our self-righteousness, exposed our self-protective defenses, and reminded us of our potential for evil.

> “*Although [Freud] clearly made a number of mistakes in the formulation of his ideas, his understanding of unconscious mental processes was pretty much on target. In fact, it is very consistent with modern neuroscientists’ belief that most mental processes are unconscious.*”
>
> *Nobel Prize-winning neuroscientist Eric Kandel (2012)*

Modern Research Challenges the Idea of Repression

Psychoanalytic theory hinges on the assumption that our mind often *represses* offending wishes, banishing them into the unconscious until they resurface, like long-lost books in a dusty attic. Recover and resolve childhood's conflicted wishes, and emotional healing should follow. Repression became a widely accepted concept, used to explain hypnotic phenomena and psychological disorders. Some psychodynamic followers extended repression to explain apparently lost and recovered memories of childhood traumas (Boag, 2006; Cheit, 1998; Erdelyi, 2006). In one survey, 88 percent of university students believed that painful experiences commonly get pushed out of awareness and into the unconscious (Garry et al., 1994).

Today's researchers agree that we sometimes preserve our self-esteem by neglecting threatening information (Green et al., 2008). Yet many contend that repression, if it ever occurs, is a rare mental response to terrible trauma. Even those who have witnessed a parent's murder or survived Nazi death camps have retained their unrepressed memories of the horror (Helmreich, 1992, 1994; Malmquist, 1986; Pennebaker, 1990). "Dozens of formal studies have yielded not a single convincing case of repression in the entire literature on trauma," concluded personality researcher John Kihlstrom (2006).

> "*During the Holocaust, many children . . . were forced to endure the unendurable. For those who continue to suffer [the] pain is still present, many years later, as real as it was on the day it occurred.*"
>
> *Eric Zillmer, Molly Harrower, Barry Ritzler, and Robert Archer,* The Quest for the Nazi Personality, *1995*

Some researchers do believe that extreme, prolonged stress, such as the stress some severely abused children experience, might disrupt memory by damaging the hippocampus (Schacter, 1996). But the far more common reality is that high stress and associated stress hormones *enhance* memory (Module 32). Indeed, rape, torture, and other traumatic events haunt survivors, who experience unwanted flashbacks. They are seared onto the soul. “You see the babies,” said Holocaust survivor Sally H. (1979). “You see the screaming mothers. You see hanging people. You sit and you see that face there. It’s something you don’t forget.”

The Modern Unconscious Mind

Freud was right about a big idea that underlies today’s psychodynamic thinking: We have limited access to all that goes on in our mind (Erdelyi, 1985, 1988, 2006; Norman, 2010). Our two-track mind has a vast out-of-sight realm. Some researchers even argue that “most of a person’s everyday life is determined by unconscious thought processes” (Bargh & Chartrand, 1999). (Perhaps, for example, you can recall being sad or mad without consciously knowing why.)

AP® EXAM TIP

It’s very important to understand the differences between Freud’s view of the unconscious and modern psychology’s view of the unconscious. Read this section carefully.

Yet many research psychologists now think of the unconscious not as hot passions and repressive censoring but as cooler information processing that occurs without our awareness. To these researchers, the unconscious also involves (as this text explains elsewhere)

- the *schemas* that automatically control our perceptions and interpretations (Module 17).
- the *priming* by stimuli to which we have not consciously attended (Modules 16 and 32).
- the right-hemisphere activity that enables the *split-brain* patient’s left hand to carry out an instruction the patient cannot verbalize (Module 13).
- the *implicit memories* that operate without conscious recall, even among

those with amnesia (Module 33).

- the *emotions* that activate instantly, before conscious analysis (Module 41).
- the *stereotypes* and *implicit prejudice* that automatically and unconsciously influence how we process information about others (Module 77).

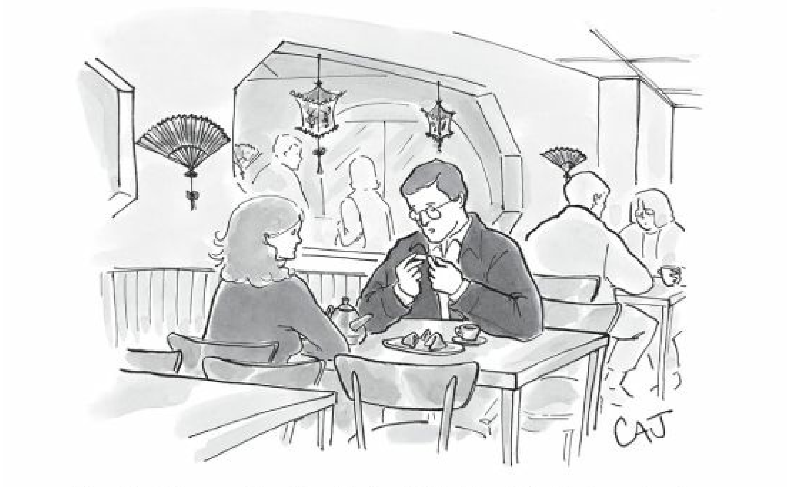
More than we realize, we fly on autopilot. Our lives are guided by off-screen, out-of-sight, unconscious information processing. The unconscious mind is huge. However, our current understanding of unconscious information processing is more like the pre-Freudian view of an underground, unattended stream of thought from which spontaneous behavior and creative ideas surface (Bargh & Morsella, 2008).

Research also supports two of Freud's defense mechanisms. One study demonstrated *reaction formation* (trading unacceptable impulses for their opposite) in men who reported strong antigay attitudes. Compared with those who did not report such attitudes, these antigay men experienced greater arousal when watching videos of homosexual men having sex (Adams et al., 1996). Likewise, some evidence suggests that people who unconsciously identify as homosexual—but who consciously identify as straight—report more negative attitudes toward gays (Weinstein et al., 2012).

Freud's *projection* (attributing our own threatening impulses to others) has also been confirmed. People do tend to see their traits, attitudes, and goals in others (Baumeister et al., 1998b; Maner et al., 2005). Today's researchers call this the *false consensus effect*—the tendency to overestimate the extent to which others share our beliefs and behaviors. People who cheat on their assignments or shoplift petty items "for thrills" tend to think many others do the same. However, defense mechanisms seem motivated less by the sexual and aggressive undercurrents that Freud imagined than by our need to protect our self-image.

Finally, research has supported Freud's idea that we unconsciously defend ourselves against anxiety. Researchers have proposed that one source of anxiety is "the terror resulting from our awareness of vulnerability and death" (Greenberg et al., 1997). Nearly 300 experiments testing **terror-management theory** show that thinking about one's mortality—for example, by writing a short essay on dying and its associated emotions—provokes various terror-management defenses (Burke et al., 2010). For example, death anxiety increases aggression toward rivals and esteem for oneself (Cohen & Solomon, 2011; Koole et al., 2006).

terror-management theory
a theory of death-related anxiety; explores people's emotional and behavioral responses to reminders of their impending death.



Carolita Johnson The New Yorker Collection/The Cartoon Bank

"It says, 'Someday you will die.'"

Faced with a threatening world, people act not only to enhance their self-esteem but also to adhere more strongly to worldviews that answer questions about life's meaning. The prospect of death promotes religious sentiments, and deep religious convictions enable people to be less defensive—less likely to rise in defense of their worldview—when reminded of death (Jonas & Fischer, 2006; Norenzayan & Hansen, 2006). Moreover, when contemplating death, people prioritize their close relationships (Cox & Arndt, 2012; Mikulincer et al., 2003). The actual death of loved ones can provoke protective responses as well. For years, I

[ND] have studied the way people respond to thoughts about death (Hayasaki, 2014; Kashdan et al., 2014). But it took the shock of my own mother's unexpected death to motivate me to start running again and to live a healthier lifestyle. Facing death can inspire us to affirm life.

✓ Check Your Understanding

Ask Yourself

- What understanding and impressions of Freud did you bring to this unit? Are you surprised to find that some of his ideas (especially the big idea of our unconscious mind) had merit?

Test Yourself

- What are three big ideas that have survived from Freud's psychoanalytic theory? What are three ways in which Freud's theory has been criticized?
- Which elements of traditional psychoanalysis have modern-day psychodynamic theorists and therapists retained, and which elements have they mostly left behind?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 55 REVIEW

55-1 What is *personality*, and what theories inform our understanding of personality?

- *Personality* is an individual's characteristic pattern of thinking, feeling, and acting.
- Psychoanalytic (and later psychodynamic) theory and humanistic theory have become part of Western culture. They laid the foundation for later theories, such as trait and social-cognitive theories of personality.

55-2 How did Sigmund Freud's treatment of psychological disorders lead to his view of the unconscious mind, and what was his view of personality?

- *Psychodynamic theories* view personality from the perspective that behavior is a lively (dynamic) interaction between the conscious and unconscious mind. The theories trace their origin to Sigmund Freud's theory of *psychoanalysis.*
- In treating patients whose disorders had no clear physical explanation, Freud concluded that these problems reflected unacceptable thoughts and feelings, hidden away in the *unconscious* mind. To explore this hidden part of a patient's mind, Freud used *free association* and dream analysis.
- Freud believed that personality results from conflict arising from the interaction among the mind's three systems: the *id* (pleasure-seeking impulses), *ego* (reality-oriented executive), and *superego* (internalized set of ideals, or conscience).

55-3 What developmental stages did Freud propose, and how did he think people defended themselves against anxiety?

- Freud believed children pass through five *psychosexual stages* (oral, anal, phallic, latency, and genital).
- According to this view, unresolved conflicts at any stage can leave a person's pleasure-seeking impulses *fixated* (stalled) at that stage.
- For Freud, anxiety was the product of tensions between the demands of the id and superego. The ego copes by using unconscious *defense mechanisms,* such as *repression,* which he viewed as the basic mechanism underlying and enabling all the others.

55-4 Which of Freud's ideas did his followers accept or reject?

- Freud's early followers, the neo-Freudians, accepted many of his ideas. They differed in placing more emphasis on the conscious mind and in stressing social motives more than sexual or aggression motives. Neo-Freudian Carl Jung proposed the *collective unconscious.*
- Contemporary psychodynamic theorists and therapists reject Freud's emphasis on sexual motivation. They stress, with support from modern research findings, the view that much of our mental life is unconscious, and they believe that our childhood experiences influence our adult personality and attachment patterns. Many also believe that our species' shared evolutionary history shaped some universal predispositions.

55-5 What are *projective tests*, how are they used, and what are some criticisms of them?

- *Projective tests* attempt to assess personality by showing people ambiguous stimuli with many possible interpretations; answers reveal unconscious motives.
- The *Thematic Apperception Test (TAT)* and the *Rorschach inkblot test* are two such tests. The TAT provides a valid and reliable roadmap of people's implicit motives, and responses have been shown to be consistent over time. The Rorschach has low reliability and validity, but some clinicians value it as a source of suggestive leads, an icebreaker, or

a revealing interview technique.

55-6 How do contemporary psychologists view Freud's psychoanalysis, and how has modern research developed our understanding of the unconscious?

- Today's psychologists give Freud credit for drawing attention to the vast unconscious, to the struggle to cope with anxiety and sexuality, and to the conflict between biological impulses and social restraints, and for some forms of defense mechanisms.
- But Freud's concept of repression, and his view of the unconscious as a collection of repressed and unacceptable thoughts, wishes, feelings, and memories, have not survived scientific scrutiny. Freud offered after-the-fact explanations, which are hard to test scientifically. And research does not support many of Freud's specific ideas, such as the view that development is fixed in childhood. (We now know it is lifelong.)
- Research confirms that we do not have full access to all that goes on in our mind, though today's science views the unconscious as a separate and parallel track of information processing that occurs outside our awareness. This processing includes schemas that control our perceptions, priming, implicit memories of learned skills, instantly activated emotions, and stereotypes that filter our information processing of others' traits and characteristics.

Multiple-Choice Questions

1. Carly's therapist asks her to simply say what is on her mind rather than responding to specific questions or topics. Her therapist is making use of a technique known as

a. the ego.
b. self-efficacy.
c. sublimation.
d. free association.

   e. identification.

2. The Freudian concept of the ego is best described as
   a. operating on the reality principle.
   b. operating on the pleasure principle.
   c. focusing solely on the morality of an issue.
   d. the repression of disturbing thoughts.
   e. striving for perfection.

3. Ella was an aggressive child in middle school. In high school, she is a successful three-sport athlete because she channels her aggression into sports. Freud would suggest that this is due to the defense mechanism of
   a. repression.
   b. reaction formation.
   c. displacement.
   d. projection.
   e. regression.

4. What did Carl Jung call the shared, inherited reservoir of memory traces from our species' history?
   a. Neurosis
   b. Archetypes
   c. Collective unconscious
   d. Inferiority complex
   e. Terror management

Practice FRQs

1. Nadina is struggling to decide whether to buy a sweater that she really cannot afford. According to Freud, what role would each of the following play in her decision?
   - Id
   - Superego

- Ego

Answer

1 point: In Freud’s view, the id is the impulsive part of our personality. Nadina’s id would cause her to buy the sweater, even though it is too expensive. Page 580

1 point: The superego is Nadina’s conscience and may cause her to feel guilty about buying a sweater that she cannot afford. Page 580

1 point: The ego operates on the reality principle and will help Nadina make the final decision about whether to buy the sweater. The ego will balance the desires of the id with the demands of the superego. Page 580

2. Describe the following two projective tests and state one criticism of these types of test.

- Thematic Apperception Test
- Rorschach inkblot test

(3 points)

Module 56 Humanistic Theories

LEARNING TARGETS

- 56-1 Describe how humanistic psychologists viewed personality, and explain their goal in studying personality.
- 56-2 Explain how humanistic psychologists assessed a person's sense of self.
- 56-3 Describe how humanistic theories have influenced psychology, and discuss the criticisms they have faced.

56-1 How did humanistic psychologists view personality, and what was their goal in studying personality?

By the 1960s, some personality psychologists had become discontented with the sometimes bleak focus on drives and conflicts in psychodynamic theory, and the mechanistic psychology of B. F. Skinner's *behaviorism* (see Modules 27 and 28). Two pioneering theorists—Abraham Maslow (1908–1970) and Carl Rogers (1902–1987)—offered a *third-force perspective* that emphasized human potential. In contrast to Sigmund Freud's emphasis on disorders born out of dark conflicts, these **humanistic theorists** emphasized the ways people strive for self-determination and self-realization. In contrast to behaviorism's scientific objectivity, they studied people through their own self-reported experiences and feelings.

humanistic theories

theories that view personality with a focus on the potential for healthy personal growth.

Abraham Maslow’s Self-Actualizing Person

Maslow proposed that we are motivated by a **hierarchy of needs** (Module 37). If our physiological needs are met, we become concerned with personal safety. If we achieve a sense of security, we then seek to love, to be loved, and to love ourselves. With our love needs satisfied, we seek self-esteem. Having achieved self-esteem, we ultimately seek **self-actualization** (the process of fulfilling our potential) and **self-transcendence** (meaning, purpose, and identity beyond the self).

hierarchy of needs

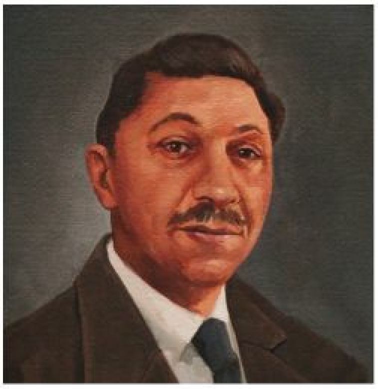
Maslow’s pyramid of human needs, beginning at the base with physiological needs that must first be satisfied before higher-level safety needs and then psychological needs become active.

self-actualization

according to Maslow, one of the ultimate psychological needs that arises after basic physical and psychological needs are met and self-esteem is achieved; the motivation to fulfill one’s potential.

self-transcendence

according to Maslow, the striving for identity, meaning, and purpose beyond the self.



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Abraham Maslow “Any theory of motivation that is worthy of attention must

> deal with the highest capacities of the healthy and strong person as well as with the defensive maneuvers of crippled spirits” (*Motivation and Personality*, 1970, p. 33).

Maslow (1970) developed his ideas by studying healthy, creative people rather than troubled clinical cases. He based his description of self-actualization on a study of those, such as Abraham Lincoln, who seemed notable for their meaningful and productive lives. Maslow reported that such people shared certain characteristics: They were self-aware and self-accepting, open and spontaneous, loving and caring, and not paralyzed by others’ opinions. Secure in their sense of who they were, their interests were problem-centered rather than self-centered. They focused their energies on a particular task, one they often regarded as their mission in life. Most enjoyed a few deep relationships rather than many superficial ones. Many had been moved by spiritual or personal *peak experiences*. These, said Maslow, are mature adult qualities found in those who have learned enough about life to be compassionate, to have outgrown their mixed feelings toward their parents, to have found their calling, to have “acquired enough courage to be unpopular, to be unashamed about being openly virtuous.”

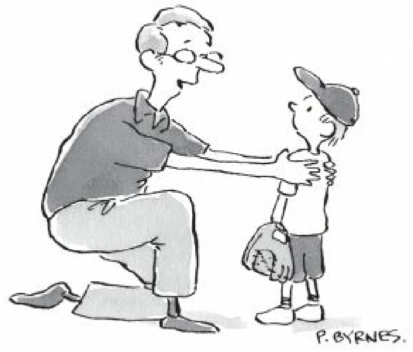
Carl Rogers’ Person-Centered Perspective

Fellow humanistic psychologist Carl Rogers agreed with much of Maslow’s thinking. Rogers’ *person-centered perspective* held that people are basically good and are endowed with self-actualizing tendencies. Unless thwarted by an environment that inhibits growth, each of us is like an acorn, primed for growth and fulfillment. Rogers (1980) believed that a growth-promoting social climate provides:

- *Acceptance:* When people are *accepting,* they offer **unconditional positive regard**, an attitude of grace that values us even knowing our failings. It is a profound relief to drop our pretenses, confess our worst feelings, and discover that we are still accepted. In a good marriage, a close family, or an intimate friendship, we are free to be spontaneous without fearing the loss of others’ esteem.
- *Genuineness:* When people are *genuine,* they are open with their own feelings, drop their facades, and are transparent and self-disclosing.
- *Empathy:* When people are *empathic,* they share and mirror other’s feelings and reflect their meanings. “Rarely do we listen with real understanding, true empathy,” said Rogers. “Yet listening, of this very special kind, is one of the most potent forces for change that I know.” (When others talk do you generally listen closely, or just await your turn to talk?)

unconditional positive regard

a caring, accepting, nonjudgmental attitude, which Carl Rogers believed would help people develop self-awareness and self-acceptance.



Pat Byrnes The New Yorker Collection
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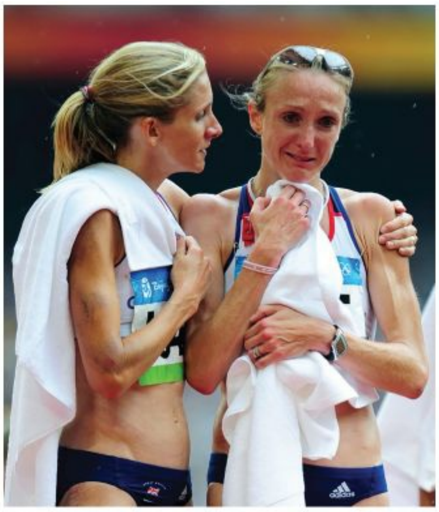
"Just remember, son, it doesn't matter whether you win or lose—unless you want Daddy's love."

A father *not* offering unconditional positive regard:

So, some things get better with *age*: *a*cceptance, *g*enuineness, and *e*mpathy. These are, Rogers believed, the water, sun, and nutrients that enable people to grow like vigorous oak trees. For "as persons are accepted and prized, they tend to develop a more caring attitude toward themselves" (Rogers, 1980, p. 116). As persons are empathically heard, "it becomes possible for them to listen more accurately to the flow of inner experiencings."



DYLAN MARTINEZ/REUTERS/Newscom

The picture of empathy Being open and sharing confidences is easier when the listener shows real understanding. Within such relationships we can relax and fully express our true selves. Consider a conversation when you knew someone was waiting for their turn to speak instead of listening to you. Now consider the last time someone heard you with empathy. How did those two experiences differ?

Writer Calvin Trillin (2006) recalled an example of parental acceptance and genuineness at a camp for children with severe disorders, where his wife, Alice, worked. L., a “magical child,” had genetic diseases that meant she had to be tube-fed and could walk only with difficulty. Alice recalled,

> One day, when we were playing duck-duck-goose, I was sitting behind her and she asked me to hold her mail for her while she took her turn to be chased around the circle. It took her a while to make the circuit, and I had time to see that on top of the pile [of mail] was a note from her mom. Then I did something truly awful. . . . I simply had to know what this child’s parents could have done to make her so spectacular, to make her the most optimistic, most enthusiastic, most hopeful human being I had ever encountered. I snuck a quick look at the note, and my eyes fell on this sentence: “If God had given us all of the children in the world to choose from, L., we would only have chosen you.” Before L. got back to her place in the circle, I showed the note to Bud, who was sitting next to me. “Quick. Read this,” I whispered. “It’s the secret of life.”

Maslow and Rogers would have smiled knowingly. For them, a central feature of personality is one’s **self-concept**—all the thoughts and feelings we have in response to the question, “Who am I?” If our self-concept is positive, we tend to act and perceive the world positively. If it is negative—if in our own eyes we fall far short of our *ideal self*—said Rogers, we feel dissatisfied and unhappy. A worthwhile goal for therapists, parents, teachers, and friends is therefore, he said, to help others know, accept, and be true to themselves.

self-concept

all our thoughts and feelings about ourselves, in answer to the question, “Who am I?”

Assessing the Self

56-2 How did humanistic psychologists assess a person’s sense of self?

Humanistic psychologists sometimes assessed personality by asking people to fill out questionnaires that would evaluate their self-concept. One questionnaire, inspired by Carl Rogers, asked people to describe themselves both as they would *ideally* like to be and as they *actually* are. When the ideal and the actual self are nearly alike, said Rogers, the self-concept is positive. Assessing his clients’ personal growth during therapy, he looked for successively closer ratings of actual and ideal selves.

Some humanistic psychologists believed that any standardized assessment of personality, even a questionnaire, is depersonalizing. Rather than forcing the person to respond to narrow categories, these humanistic psychologists presumed that interviews and intimate conversation would provide a better understanding of each person’s unique experiences. Some researchers believe our identity may be revealed using the *life story approach*—collecting a rich narrative detailing each person’s unique life history (Adler et al., 2016; McAdams & Guo, 2015). A lifetime of stories can show more of a person’s complete identity than can the responses to a few questions.

Evaluating Humanistic Theories

56-3 How have humanistic theories influenced psychology? What criticisms have they faced?

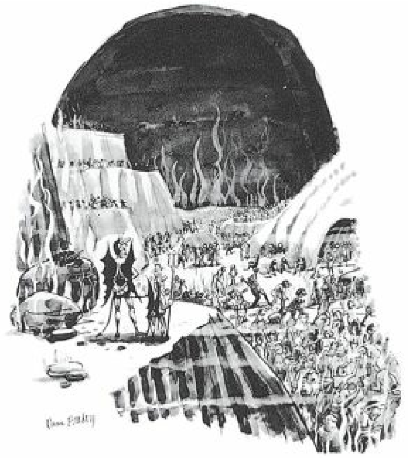
One thing said of Freud can also be said of the humanistic psychologists: Their impact has been pervasive. Maslow's and Rogers' ideas have influenced counseling, education, child raising, and management. And they laid the groundwork for today's scientific *positive psychology* subfield (Module 44).

These theorists have also influenced—sometimes in unintended ways—much of today's popular psychology. Is a positive self-concept the key to happiness and success? Do acceptance and empathy nurture positive feelings about ourselves? Are people basically good and capable of self-improvement? Many people answer *Yes, Yes,* and *Yes.* In 2006, U.S. high school students reported notably higher self-esteem and greater expectations of future career success than did students living in 1975 (Twenge & Campbell, 2008). Given a choice, today's North American college students mostly say they'd rather get a self-esteem boost, such as a compliment or good grade on a paper, than enjoy a favorite food (Bushman et al., 2011). Humanistic psychology's message has been heard.

But the prominence of the humanistic perspective set off a backlash of criticism. First, said the critics, its concepts are vague and subjective. Consider Maslow's description of self-actualizing people as open, spontaneous, loving, self-accepting, and productive. Is this a scientific description? Or is it merely a description of the theorist's own values and ideals? Maslow, noted M. Brewster Smith (1978), offered impressions of his own personal heroes. Imagine another theorist who began with a different set of heroes—perhaps Napoleon, John D. Rockefeller, Sr., and U.S. President Donald Trump. This theorist would likely describe self-actualizing people as "undeterred by others' opinions," "motivated to achieve," and "comfortable with power."

Critics also objected to the idea that, as Rogers (1985) put it, "The only question which matters is, ‘Am I living in a way which is deeply satisfying to me, and which truly expresses me?’” This emphasis on *individualism*—trusting and acting on one’s feelings, being true to oneself, fulfilling oneself—could lead to self-indulgence, selfishness, and an erosion of moral restraint (Campbell & Specht, 1985; Wallach & Wallach, 1983). Imagine working on a group project with people who refuse to complete any task that is not deeply satisfying or does not truly express their identity.

Humanistic psychologists have replied that a secure, nondefensive self-acceptance is actually the first step toward loving others. Indeed, people who feel intrinsically liked and accepted—for who they are, not just for their achievements—exhibit less defensive attitudes (Schimel et al., 2001). Those feeling liked and accepted by a romantic partner report being happier in their relationships and acting more kindly toward their partner (Gordon & Chen, 2010).



Dana Fradon The New Yorker Collection
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“We do pretty well when you stop to think that people are basically good.”

A final accusation leveled against humanistic psychology is that it is *naive*—that it fails to appreciate the reality of our human capacity for evil (May, 1982). Faced with climate change, overpopulation, terrorism, and the spread of nuclear weapons, we may become apathetic from either of two rationalizations. One is a starry-eyed optimism that denies the threat (“People are basically good; everything will work out”). The other is a dark despair (“It’s hopeless; why try?”). Action requires enough realism to fuel concern and enough optimism to provide hope. (Pessimism often fulfills its own predictions by restraining our efforts at change.) Humanistic psychology, say the critics, encourages the needed hope but not the equally necessary realism.

✓ Check Your Understanding

Ask Yourself

- Have you had someone in your life who accepted you unconditionally? How did this person help you to know yourself better and to develop a better image of yourself?

Test Yourself

- How did humanistic psychology provide a fresh perspective?
- What does it mean to be empathic? How about self-actualized? Which humanistic psychologists used these terms?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 56 REVIEW

56-1 How did humanistic psychologists view personality, and what was their goal in studying personality?

- The *humanistic* psychologists' view of personality focused on the potential for healthy personal growth and people's striving for self-determination and self-realization.
- Abraham Maslow proposed that human motivations form a *hierarchy of needs;* if basic needs are fulfilled, people will strive toward *self-actualization* and *self-transcendence.*
- Carl Rogers' person-centered perspective suggested that the ingredients of a growth-promoting environment are acceptance (including *unconditional positive regard*), genuineness, and empathy.
- *Self-concept* was a central feature of personality for both Maslow and Rogers.

56-2 How did humanistic psychologists assess a person's sense of self?

- Some rejected any standardized assessments and relied on interviews and conversations.
- Rogers sometimes used questionnaires in which people described their ideal and actual selves, which he later used to judge progress during therapy.

56-3 How have humanistic theories influenced psychology? What criticisms have they faced?

- Humanistic psychology helped renew interest in the concept of self, and also laid the groundwork for today's scientific subfield of positive psychology.

- Critics have said that humanistic psychology’s concepts were vague and subjective, its values self-centered, and its assumptions naively optimistic.

Multiple-Choice Questions

1. Maslow and Rogers would explain that adolescents who are struggling to form their identity are seeking to discover their

a. self-transcendence.
b. self-actualization.
c. self-esteem.
d. self-worth.
e. self-concept.

2. What do we call the process of fulfilling our potential?

a. Free association
b. Self-efficacy
c. Unconditional positive regard
d. Self-concept
e. Self-actualization

3. Humanistic psychologists may assess personality by

a. asking a person to compare their ideal self to their actual self.
b. asking people to fill out lengthy questionnaires about their beliefs.
c. getting people to describe what they see in ambiguous inkblots.
d. having a person describe their dreams.
e. putting people in a stressful situation to see how they behave under pressure.

4. Which of the following is an example of unconditional positive regard?

a. Mr. and Mrs. Prohaska, who have been married for 37 years, credit the success of their marriage to the fact that each has been able to accept the faults of the other without criticism.
b. Seven-year-old Michaela is only given her allowance when she does her chores.

c. Ms. Lopez, a second grade teacher, only gives smiley-face stickers to students who sit quietly at their desks during math.
d. John got a promotion and a raise at work after filling in for a sick manager one day and doing a better job than the manager.
e. Chen’s parents usually praise him when he does well and ignore him when he engages in minor misbehavior.

Practice FRQs

1. As a new student, Canya is hoping to fit in. If the students at her new school were embracing the ideas of Carl Rogers, how would each of these principles affect how they treat Canya?

- Acceptance
- Genuineness
- Empathy

Answer

1 point: When employing Rogers’ *acceptance*, people show unconditional positive regard—others are accepted despite their faults and failures. Canya will probably make mistakes at her new school, but the established students would understand that it is because she is new and not judge her because of them. Page 592

1 point: When following Rogers’ *genuineness*, people are open with their feelings. The students at the school would be themselves around Canya and provide her with advice about how to fit in. Page 592

1 point: When employing Rogers’ *empathy*, people share and mirror the feelings of others. In this case, students might remember a time that they were in a new place and understand how Canya is feeling. Page 592

2. Describe three criticisms that have been made of humanistic psychology.

(3 points)

Module **57 Trait Theories**

LEARNING TARGETS

- 57-1 Explain how psychologists use traits to describe personality.
- 57-2 Discuss some common misunderstandings about introversion.
- 57-3 Describe *personality inventories*, and discuss their strengths and weaknesses as trait-assessment tools.
- 57-4 Identify the traits that seem to provide the most useful information about personality variation.
- 57-5 Discuss whether research supports the consistency of personality traits over time and across situations.

57-1 How do psychologists use traits to describe personality?

Rather than focusing on unconscious forces and thwarted growth opportunities, some researchers attempt to define personality in terms of stable and enduring behavior patterns, such as Lady Gaga's openness to new experiences and her self-discipline. This perspective can be traced in part to a remarkable meeting in 1919, when Gordon Allport, a curious 22-year-old psychology student, interviewed Sigmund Freud in Vienna. Allport soon discovered just how preoccupied the founder of psychoanalysis was with finding hidden motives, even in Allport's own behavior during the interview. That experience ultimately led Allport to do what Freud did not do: to describe personality in terms of fundamental **traits**, or people's characteristic behaviors and conscious motives (such as the curiosity that actually motivated Allport to see Freud). Meeting Freud, said Allport, “taught me that [psychoanalysis], for all its merits, may plunge too deep, and that psychologists would do well to give full recognition to manifest motives before probing the unconscious.” Allport came to define personality in terms of identifiable behavior patterns. He was concerned less with *explaining* individual traits than with *describing* them.

trait
a characteristic pattern of behavior or a disposition to feel and act in certain ways, as assessed by self-report inventories and peer reports.

Like Allport, Isabel Briggs Myers (1987) and her mother, Katharine Briggs, wanted to describe important personality differences. They attempted to sort people according to Carl Jung’s *personality types,* based on their responses to 126 questions. The *Myers-Briggs Type Indicator (MBTI),* available in 20+ languages, has been taken by millions of people, mostly for counseling, leadership training, and work-team development (CPP, 2017). It offers choices, such as “Do you usually value sentiment more than logic, or value logic more than sentiment?” Then it counts the test-taker’s preferences, labels them as indicating, say, a “feeling type” or “thinking type,” and feeds them back to the person in complimentary terms. Feeling types, for example, are told they are “sympathetic, appreciative, and tactful”; thinking types are told they are “good at analyzing.” (Every type has its strengths, so everyone is affirmed.)

Most people agree with their announced MBTI type profile, which mirrors their declared preferences. They may also accept their label as a basis for being matched with work partners and tasks that supposedly suit their temperaments. But research suggests that people should not blindly accept the validity of their test results. A National Research Council report noted that despite the test’s popularity in business and career counseling, its use has outrun research on its validity as a job performance predictor:

“The popularity of this instrument in the absence of proven scientific worth is troublesome” (Druckman & Bjork, 1991, p. 101; see also Pittenger, 1993). Although research on the MBTI has been accumulating since those cautionary words were expressed, the test remains mostly a counseling and coaching tool, not a research instrument.

James Devaney/Getty Images

Stephen Colbert: The extravert Trait labels such as *extraversion* can describe our temperament and typical behaviors.

Exploring Traits

Classifying people as one or another distinct personality type fails to capture their full individuality. We are each a unique complex of multiple traits. So how else could we describe our personalities? We might describe an apple by placing it along several trait dimensions—relatively large or small, red or green, sweet or tart. By placing people on several trait dimensions simultaneously, psychologists can describe countless individual personality variations. (Remember from Module 18 that variations on just three color dimensions—*hue*, *saturation*, and *brightness*—create many thousands of colors.)

What trait dimensions describe personality? If you were looking at profiles on an Internet dating site, what personality traits would give you the best sense for each person? Allport and his associate H. S. Odbert (1936) counted all the words in an unabridged dictionary with which one could describe people. There were almost 18,000! How, then, could psychologists condense the list to a manageable number of basic traits?

AP® EXAM TIP

You are not likely to be asked questions about the specific traits in Figure 57.1. Focus instead on the two main dimensions (extraversion–introversion and stability–instability), and use the traits to get a sense of what the main dimensions mean.

Factor Analysis

▶ **Flip It Video: Factor Analysis**

One technique is *factor analysis*, a statistical procedure that identifies clusters (factors) of test items that tap basic components of a trait (McCabe & Fleeson, 2016). Imagine that people who describe themselves as outgoing also tend to say that they like excitement and practical jokes and dislike quiet reading. Such a statistically correlated cluster of behaviors reflects a basic factor, or trait—in this case, *extraversion.*

British psychologists Hans Eysenck and Sybil Eysenck [EYE-zink] believed that we can reduce many of our normal individual variations to two dimensions: *extraversion–introversion* and *emotional stability–instability* (**Figure 57.1**). People in 35 countries around the world, from China to Uganda to Russia, have taken the *Eysenck Personality Questionnaire.* When their answers were analyzed, the extraversion and emotionality factors inevitably emerged as basic personality dimensions (Eysenck, 1990, 1992). The Eysencks believed, and research confirms, that these factors are genetically influenced.

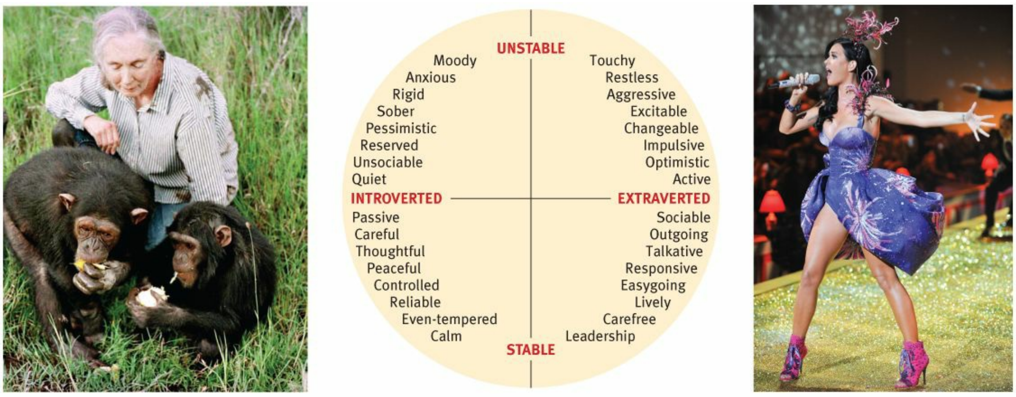
UNSTABLE
Moody
Anxious
Rigid
Sober
Pessimistic
Reserved
Unsociable
Quiet
Touchy
Restless
Aggressive
Excitable
Changeable
Impulsive
Optimistic
Active
INTROVERTED
EXTRAVERTED
Passive
Careful
Thoughtful
Peaceful
Controlled
Reliable
Even-tempered
Calm
Sociable
Outgoing
Talkative
Responsive
Easygoing
Lively
Carefree
Leadership
STABLE

Figure 57.1
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Left photo: JEAN-MARC BOUJU/AP Images; Right photo: Everett Collection Inc/Alamy

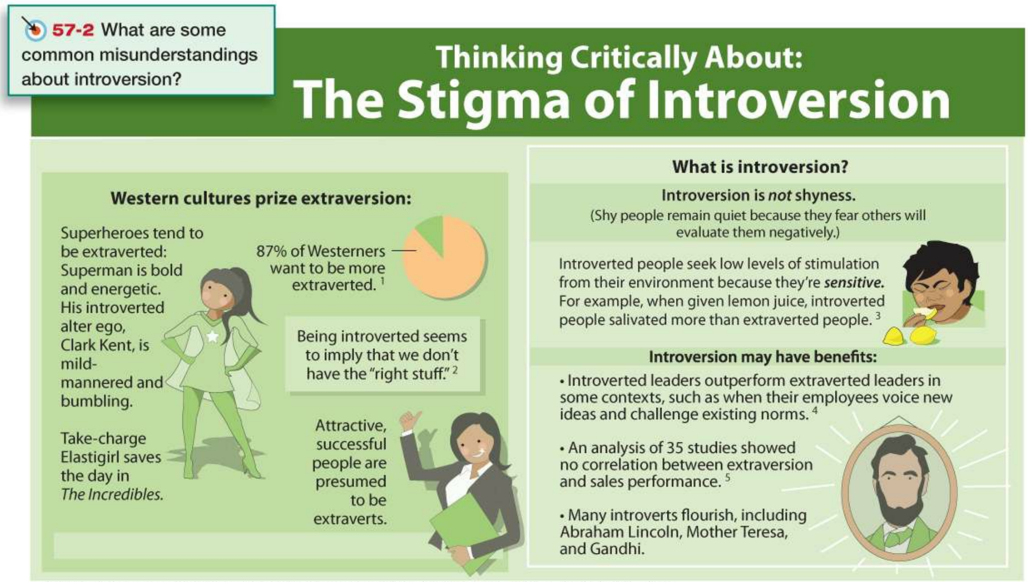
Figure 57.1 Two personality dimensions

Mapmakers can tell us a lot by using two axes (north–south and east–west). Two primary personality factors (extraversion–introversion and stability–instability) are similarly useful as axes for describing personality variation. Varying combinations define other, more specific traits (Eysenck & Eysenck, 1963). Those who are naturally introverted, such as primatologist Jane Goodall, may be particularly gifted in field studies. Successful entertainers, including Katy Perry, are often natural extraverts.

Biology and Personality

Brain-activity scans of extraverts add to the growing list of traits and mental states now being explored with brain-imaging procedures. Such studies indicate that extraverts seek stimulation because their normal brain arousal is relatively low. For example, PET scans have shown that a frontal lobe area involved in behavior inhibition is less active in extraverts than in introverts (Johnson et al., 1999). Dopamine and dopamine-related neural activity tend to be higher in extraverts (Kim et al., 2008; Wacker et al., 2006).

Our biology influences our personality in other ways as well. Recall from the twin and adoption studies in Module 14 that our genes have much to say about the behavioral style that shape our personality. Jerome Kagan, for example, has attributed differences in children's shyness and inhibition to their autonomic nervous system reactivity (see Thinking Critically About: The Stigma of Introversion). Those with a reactive autonomic nervous system respond to stress with greater anxiety and inhibition. The fearless, curious child may become the rock-climbing or fast-driving adult.



57-2 What are some common misunderstandings about introversion?

Thinking Critically About:

The Stigma of Introversion

Western cultures prize extraversion:

Superheroes tend to be extraverted: Superman is bold and energetic. His introverted alter ego, Clark Kent, is mild-mannered and bumbling.

Take-charge Elastigirl saves the day in *The Incredibles.*

87% of Westerners want to be more extraverted.[1]

Being introverted seems to imply that we don't have the "right stuff."[2]

Attractive, successful people are presumed to be extraverts.

What is introversion?

Introversion is *not* shyness.

(Shy people remain quiet because they fear others will evaluate them negatively.)

Introverted people seek low levels of stimulation from their environment because they're ***sensitive.*** For example, when given lemon juice, introverted people salivated more than extraverted people.[3]

Introversion may have benefits:

- Introverted leaders outperform extraverted leaders in some contexts, such as when their employees voice new ideas and challenge existing norms.[4]
- An analysis of 35 studies showed no correlation between extraversion and sales performance.[5]
- Many introverts flourish, including Abraham Lincoln, Mother Teresa, and Gandhi.

1. Hudson & Roberts, 2014. 2. Cain, 2012. 3. Corcoran, 1964. 4. Grant et al., 2011. 5. Barrick et al., 2001.

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Personality differences among dogs (in energy, affection, reactivity, and curious intelligence) are as evident, and as consistently judged, as personality differences among humans (Gosling et al., 2003; Jones & Gosling, 2005). Monkeys, bonobos, chimpanzees, orangutans, and even birds and fish also have distinct and stable personalities (Latzman et al., 2015; Pennisi, 2016; Weiss et al., 2006, 2015). Among the Great Tit (a European relative of the American chickadee), bold birds more quickly inspect new objects and explore trees (Groothuis & Carere, 2005; Verbeek et al., 1994). Through selective breeding, researchers can produce bold or shy birds. Both have their place in natural history: In lean years, bold birds are more likely to find food; in abundant years, shy birds feed with less risk.

Chris Cardone

Pups have personality

Assessing Traits

57-3 What are *personality inventories*, and what are their strengths and weaknesses as trait-assessment tools?

If stable and enduring traits guide our actions, can we devise valid and reliable tests of them? Several trait assessment techniques exist—some more valid than others. Some provide quick assessments of a single trait, such as extraversion, anxiety, or self-esteem. **Personality inventories**—longer questionnaires covering a wide range of feelings and behaviors—assess several traits at once.

personality inventory

a questionnaire (often with *true-false* or *agree-disagree* items) on which people respond to items designed to gauge a wide range of feelings and behaviors; used to assess selected personality traits.

The classic personality inventory is the **Minnesota Multiphasic Personality Inventory (MMPI)**. Although the MMPI was originally developed to identify emotional disorders, it also assesses people's personality traits. One of its creators, Starke Hathaway (1960), compared his effort with that of Alfred Binet (who, as you will see in Module 61, developed the first intelligence test by selecting items that identified children who would probably have trouble progressing normally in French schools). Like Binet's items, the MMPI items were **empirically derived**: From a large pool of items, Hathaway and his colleagues selected those on which particular diagnostic groups differed. "Nothing in the newspaper interests me except the comics" may seem superficial, but it just so happened that depressed people were more likely to answer *True*. (Nevertheless, people have had fun spoofing the MMPI with their own mock items: "Weeping brings tears to my eyes," "Frantic screams make me nervous," and "I stay in the bathtub until I look like a raisin" [Frankel et al., 1983].) The researchers grouped the questions into 10 clinical scales, including scales that assess depressive tendencies, masculinity–femininity, and introversion–extraversion. Today's MMPI-2 has additional scales that assess work attitudes, family problems, and anger.

Minnesota Multiphasic Personality Inventory (MMPI)

the most widely researched and clinically used of all personality tests. Originally developed to identify emotional disorders (still considered its most appropriate use), this test is now used for many other screening purposes.

empirically derived test

a test (such as the MMPI) created by selecting from a pool of items those that discriminate between groups.

Whereas most projective tests (such as the Rorschach) are scored subjectively, personality inventories are scored objectively. Objectivity does not, however, guarantee validity. For example, individuals taking the MMPI for employment purposes can give socially desirable answers to create a good impression. But in so doing they may also score high on a *lie scale* that assesses faking (as when people respond *False* to a universally true statement such as "I get angry sometimes"). The objectivity of the MMPI has contributed to its popularity and its translation into more than 100 languages.

FYI

Psychologists working from the trait perspective have devised scientifically sound *personality inventories* that assess our traits. But beware of the hundreds of online self-assessments that are neither reliable nor valid.

The Big Five Factors

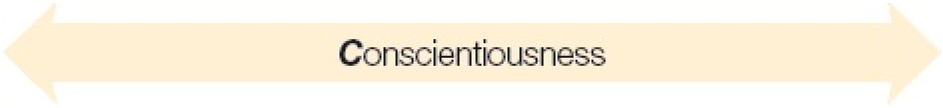
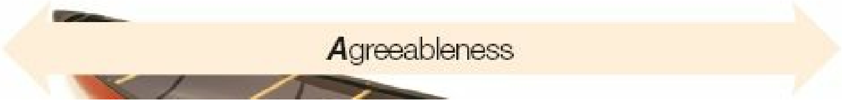
57-4 Which traits seem to provide the most useful information about personality variation?

AP® EXAM TIP

Table 57.1 is an excellent summary of the Big Five personality factors and what they mean. Be able to apply the traits to describe behavior. For example, you should be able to explain how high levels of agreeableness might help someone with a particular task.

Today's trait researchers believe that simple trait factors, such as the Eysencks' introversion–extraversion and stability–instability dimensions, are important, but they do not tell the whole story. A slightly expanded set of factors developed by Robert McCrae and Paul Costa—dubbed the *Big Five*—does a better job (Costa & McCrae, 2011). If a test specifies where you are on the five dimensions (conscientiousness, agreeableness, neuroticism, openness, and extraversion; see **Table 57.1**), it has said much of what there is to say about your personality.

TABLE 57.1 The "Big Five" Personality Factors Researchers use self-r inventories and peer reports to assess and score the Big Five personali

(*Memory tip:* Picturing a **CANOE** will help you recall these.)	
Disorganized, careless, impulsive	
Ruthless, suspicious, uncooperative	

Calm, secure, self-satisfied	Neuroticism (emotional stability vs. instability)
Practical, prefers routine, conforming	
Retiring, sober, reserved	Extraversion

Source: Information from McCrae & Costa (1986, 2008).

Around the world—across 56 nations and 29 languages in one study (Schmitt et al., 2007)—people describe others in terms roughly consistent with this list. The Big Five—today's "common currency for personality psychology" (Funder, 2001)—has been the most active personality research topic since the early 1990s and is currently our best approximation of the basic trait dimensions.

Big Five research has explored various questions:

- ***How stable are these traits?*** One research team analyzed 1.25 million participants ages 10 to 65. They learned that personality continues to develop and change through late childhood and adolescence. Up to age 40, we show signs of a *maturity principle:* We become more conscientious and agreeable and less neurotic (emotionally unstable) (Bleidorn, 2015; Milojev & Sibley, 2016). Great apes show similar personality maturation (Weiss & King, 2015). After age 40, our traits further stabilize.
- ***How heritable are these traits?*** Heritability (the extent to which individual differences are attributable to genes) generally runs about 40 percent for each dimension (Vukasovi´c & Bratko, 2015). Many genes, each having small effects, combine to influence our traits (McCrae et al., 2010; van den Berg et al., 2016).
- ***Do these traits reflect differing brain structure?*** The size and thickness

of brain tissue correlates with several Big Five traits (DeYoung et al., 2010; Grodin & White, 2015; Riccelli et al., 2017). For example, those who score high on conscientiousness tend to have a larger frontal lobe area that aids in planning and controlling behavior. Brain connections also influence the Big Five traits (Adelstein et al., 2011). People high in neuroticism (emotional instability) have brains that are wired to experience stress intensely (Shackman et al., 2016; Xu et al., 2012).

- ***Do these traits reflect birth order?*** After controlling for other variables such as family size, are first-born children, for example, more conscientious and agreeable? Contrary to popular opinion, several massive studies failed to find any association between birth order and personality (Damian & Roberts, 2015; Harris, 2009; Rohrer et al., 2015).
- ***How well do these traits apply to various cultures?*** The Big Five dimensions describe personality in various cultures reasonably well (Fetvadjiev et al., 2017; Schmitt et al., 2007; Vazsonyi et al., 2015). After studying people from 50 cultures, Robert McCrae and 79 co-researchers concluded that “features of personality traits are common to all human groups” (2005).
- ***Do the Big Five traits predict our actual behaviors?*** *Yes.* If people report being outgoing, conscientious, and agreeable, “they probably are telling the truth,” reports McCrae (2011). Conscientiousness and agreeableness predict workplace success, and agreeableness predicts helpfulness (Habashi et al., 2016; Sackett & Walmsley, 2014). Traits also characterize certain career paths. For example, U.S. politicians often have “big” personalities, outscoring the general public on extraversion, agreeableness, conscientiousness, and emotional stability (low neuroticism) (Hanania, 2017). Our traits also appear in our language patterns. In text messaging, extraversion predicts use of personal pronouns. Neuroticism predicts negative-emotion words (Holtgraves, 2011).

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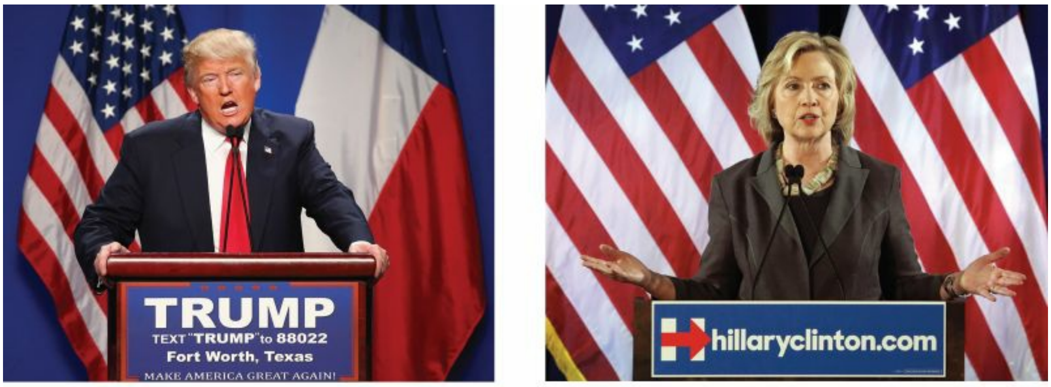
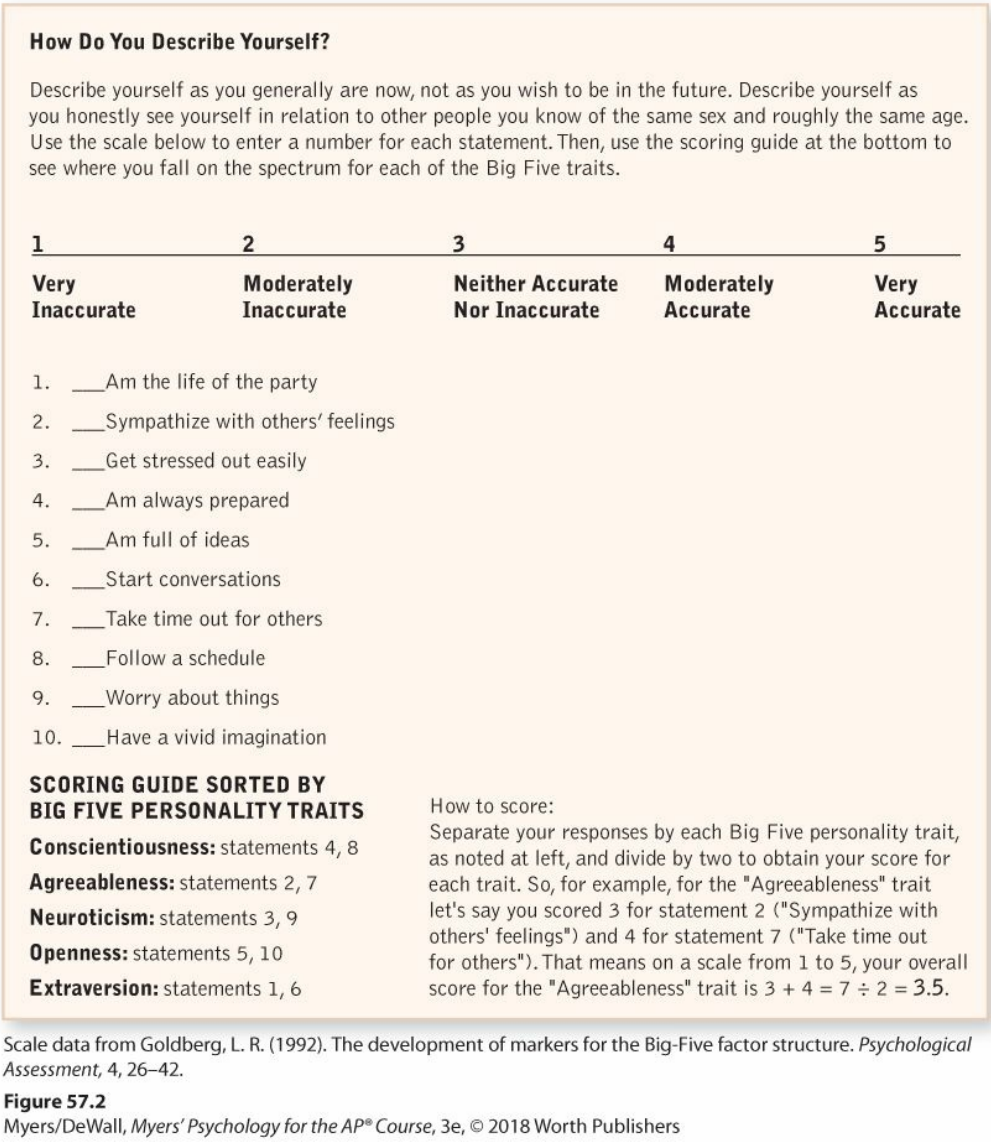
How do you vote? Let me count the likes. Researchers can use your Facebook likes to predict your Big Five traits, your opinions, and your political attitudes (Youyou et al., 2015). Companies gather these "big data" for advertisers (who then personalize the ads you see). They do the same for political candidates, who can target you with persuasive messages. In the 2016 U.S. presidential campaign, "both sides were certainly using big data . . . to win over voters," says researcher Michal Kosinski (Zakaria, 2017).



Left: Tom Pennington/Getty Images; Right: KENA BETANCUR/Getty Images

By exploring such questions, Big Five research has sustained trait psychology and renewed appreciation for the importance of personality. (To describe your personality, try the brief self-assessment in **Figure 57.2**.) Traits matter. In the next section, we will see that situations matter, too.



How Do You Describe Yourself?

Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself in relation to other people you know of the same sex and roughly the same age. Use the scale below to enter a number for each statement. Then, use the scoring guide at the bottom to see where you fall on the spectrum for each of the Big Five traits.

1	2	3	4	5
Very Inaccurate	**Moderately Inaccurate**	**Neither Accurate Nor Inaccurate**	**Moderately Accurate**	**Very Accurate**

1. ___Am the life of the party
2. ___Sympathize with others' feelings
3. ___Get stressed out easily
4. ___Am always prepared
5. ___Am full of ideas
6. ___Start conversations
7. ___Take time out for others
8. ___Follow a schedule
9. ___Worry about things
10. ___Have a vivid imagination

SCORING GUIDE SORTED BY BIG FIVE PERSONALITY TRAITS

Conscientiousness: statements 4, 8

Agreeableness: statements 2, 7

Neuroticism: statements 3, 9

Openness: statements 5, 10

Extraversion: statements 1, 6

How to score:
Separate your responses by each Big Five personality trait, as noted at left, and divide by two to obtain your score for each trait. So, for example, for the "Agreeableness" trait let's say you scored 3 for statement 2 ("Sympathize with others' feelings") and 4 for statement 7 ("Take time out for others"). That means on a scale from 1 to 5, your overall score for the "Agreeableness" trait is 3 + 4 = 7 ÷ 2 = 3.5.

Scale data from Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment*, 4, 26–42.

Figure 57.2
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Figure 57.2 The Big Five self-assessment

Check Your Understanding

Ask Yourself

- Before trying the self-assessment in Figure 57.2, where would you have placed yourself on the Big Five personality dimensions? Where might your family and friends place you? Did the actual results surprise you, and do you think these results would surprise them?

Test Yourself

- Which two primary dimensions did Hans Eysenck and Sybil Eysenck propose for describing personality variation?

- What are the Big Five personality factors, and why are they scientifically useful?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Evaluating Trait Theories

57-5 Does research support the consistency of personality traits over time and across situations?

Are our personality traits stable and enduring? Or does our behavior depend on where and with whom we find ourselves? In some ways, our personality seems stable. Cheerful, friendly children tend to become cheerful, friendly adults. At a college reunion, I [DM] was amazed to find that my jovial former classmates were still jovial, the shy ones still shy, the happy-seeming people still smiling and laughing *50 years later*. But it's also true that a fun-loving jokester can suddenly turn serious and respectful at a job interview. New situations and major life events can shift the personality traits we express. Becoming unemployed, for example, may make us less agreeable and open-minded (Boyce et al., 2015).

The Person-Situation Controversy

Our behavior is influenced by the interaction of our inner disposition with our environment. Still, the question lingers: Which is more important? When we explore this *person-situation controversy*, we look for genuine personality traits that persist over time *and* across situations. Are some people dependably conscientious and others unreliable, some cheerful and others dour, some friendly and outgoing and others shy? If we are to consider friendliness a trait, friendly people must act friendly at different times and places. Do they?

FYI

Roughly speaking, the temporary, external influences on behavior are the focus of *social psychology*, and the enduring, inner influences are the focus of *personality psychology*. In actuality, behavior always depends on the interaction of persons with situations.

In earlier units, we considered research that has followed lives through time. We noted that some scholars (especially those who study infants) are impressed with personality change; others are struck by personality stability during adulthood. As **Figure 57.3** illustrates, data from 152 long-term *(longitudinal)* studies reveal that personality trait scores are positively correlated with scores obtained seven years later, and that as people grow older their personality stabilizes. Interests may change—the avid tropical-fish collector may become an avid gardener. Careers may change—the determined salesperson may become a determined social worker. Relationships may change—the hostile spouse may start over and antagonize a new partner. But most people recognize just who they are, as Robert McCrae and Paul Costa noted (1994), “and it is well that they do. A person’s recognition of the inevitability of his or her one and only personality is . . . the culminating wisdom of a lifetime.”

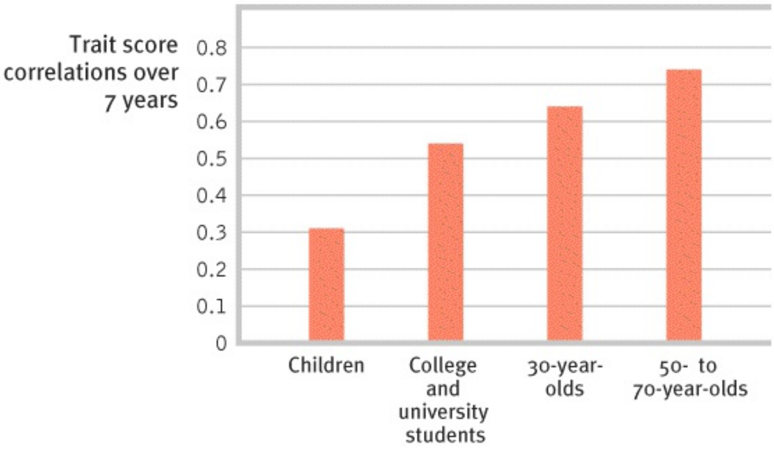

Figure 57.3
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Data from Roberts & DelVecchio, 2000.

Figure 57.3 Personality stability

With age, personality traits become more stable, as reflected in the stronger correlation of trait scores with follow-up scores 7 years later.

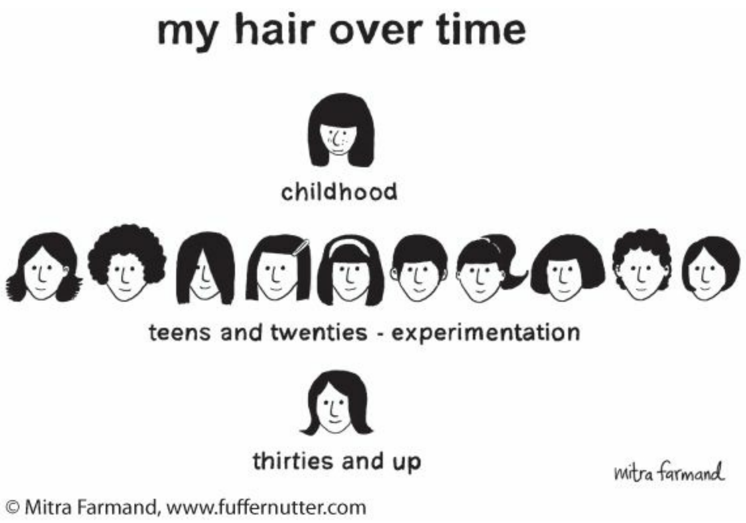
So most people—including most psychologists—would probably presume the stability of personality traits. Moreover, our traits are socially significant. They influence our health, our thinking, and our job choices and performance (Hogan, 1998; Jackson et al., 2012; Sutin et al., 2011).

Studies that follow lives through time show that personality traits rival socioeconomic status and cognitive ability as predictors of mortality, divorce, and occupational attainment (Roberts et al., 2007).

FYI

Change and consistency can coexist. If all people were to become somewhat less shy with age, there would be personality change, but also relative stability and predictability.

Although our personality *traits* may be both stable and potent, the consistency of our specific *behaviors* from one situation to the next is another matter. What relationship would you expect to find between being conscientious in one situation (say, showing up for class on time) and being conscientious in another (say, avoiding unhealthy foods)? If you've noticed how outgoing you are in some situations and how reserved you are in others, perhaps you said, "Very little." That's what researchers have found—only a small correlation (Mischel, 1968; Sherman et al., 2015). This inconsistency in behaviors also makes personality test scores weak predictors of behaviors. People's scores on an extraversion test, for example, do not neatly predict how sociable they actually will be on any given occasion.



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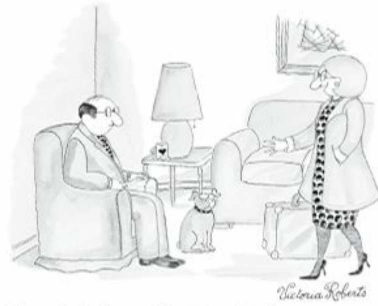
It's not just personality that stabilizes with age.

If we remember such results, we will be more cautious about labeling and pigeonholing individuals (Mischel, 1968). Years in advance, science can tell us the phase of the Moon for any given date. A day in advance, meteorologists can often predict the weather. But we are much further from being able to predict how *you* will feel and act tomorrow.



Victoria Roberts The New Yorker Collection/The Cartoon Bank

"I'm going to France—I'm a different person in France."

However, people's *average* outgoingness, happiness, or carelessness over many situations is predictable (Epstein, 1983a,b). People who know someone well, therefore, generally agree when rating that person's shyness or agreeableness (Jackson et al., 2015; Kenrick & Funder, 1988). By collecting snippets of people's daily experience via body-worn recording devices, Matthias Mehl and his colleagues (2006) confirmed that extraverts really do talk more. (I [DM] have repeatedly vowed to cut back on my jabbering and joking during my noontime pickup basketball games with friends. Alas, moments later, the irrepressible chatterbox inevitably reoccupies my body. And I [ND] have a similar experience each time I try to stay quiet in taxis. Somehow, I always end up chatting with the driver!) As our best friends can verify, we do have persistent (genetically influenced) personality traits. And our personality traits get expressed in our:

- *music preferences.* Your playlist reveals something of your personality. Classical, jazz, blues, and folk music lovers tend to be open to experience. Extraverts tend to prefer upbeat and energetic music. Country, pop, and religious music lovers tend to be cheerful, outgoing, and conscientious (Langmeyer et al., 2012; Rentfrow & Gosling, 2003, 2006). On first meeting, students often disclose their music preferences to one another; in doing so, they are swapping information about their personalities.

- *written communications.* If you have ever felt you could detect someone's personality from their writing voice, you are right!! What a cool finding!!! ☺ People's writings—even their brief tweets and Facebook posts—often express their extraversion, self-esteem, and agreeableness (Orehek & Human, 2017; Park et al., 2015; Pennebaker, 2011). "Off to meet a friend. Woohoo!!!" posted one Facebook user who had scored high on extraversion (Kern et al., 2014). Extraverts also use more adjectives.
- *online and personal spaces.* Are online profiles, websites, and avatars also a canvas for self-expression? Or are they an opportunity for people to present themselves in false or misleading ways? It's more the former (Back et al., 2010; Gosling et al., 2007; Marcus et al., 2006). People who seemed most likable on their Facebook or Twitter pages also seemed most likable in person (Qiu et al., 2012; Weisbuch et al., 2009). Even mere photos, with their associated clothes, expressions, and postures, can give clues to personality (Naumann et al., 2009). Our living and working spaces also help us express our identity. They all offer clues to our extraversion, agreeableness, conscientiousness, and openness (Back et al., 2010; Fong & Mar, 2015; Gosling, 2008).

In unfamiliar, formal situations—perhaps as a guest in the home of a person from another culture—our traits remain hidden as we carefully attend to social cues. In familiar, informal situations—just hanging out with friends—we feel less constrained, allowing our traits to emerge (Buss, 1989). In these informal situations, our expressive styles—our animation, manner of speaking, and gestures—are impressively consistent. Viewing "thin slices" of someone's behavior—such as seeing a photo for a mere fraction of a second, or seeing several 2-second video clips of a teacher in action—can tell us a lot about the person's basic personality traits (Ambady, 2010; Tackett et al., 2016).

Joe Baraban/Alamy

Room with a cue Even at “zero acquaintance,” people can catch a glimpse of others’ personality from looking at their online and personal spaces. So, what’s your read on this person?

Some people are naturally expressive (and therefore talented at pantomime and charades); others are less expressive (and therefore better poker players). To evaluate people’s voluntary control over their expressiveness, researchers asked people to *act* as expressive or inhibited as possible while stating opinions (DePaulo et al., 1992). Their remarkable findings: Inexpressive people, even when feigning expressiveness, were less expressive than expressive people acting naturally. Similarly, expressive people, even when trying to seem inhibited, were less inhibited than inexpressive people acting naturally. It’s hard to be someone you’re not, or not to be who you are.

To sum up, we can say that at any moment the immediate situation powerfully influences a person’s behavior. Social psychologists have learned that this is especially so when a “strong situation” makes clear demands (Cooper & Withey, 2009). We can better predict drivers’ behavior at traffic lights from knowing the color of the lights than from knowing the drivers’ personalities. Thus, teachers may perceive certain students as subdued (based on their classroom behavior), but friends may perceive them as pretty wild (based on their party behavior). Averaging our behavior across many occasions does, however, reveal distinct personality traits. Traits exist. We differ. And our differences matter.

✓ Check Your Understanding

Ask Yourself

- How do think your own personality traits shine through in your music preferences, communication style, and online and personal spaces? Can you recall a recent time in which the situation you were in definitely constrained your usual behavior?

Test Yourself

- How well do personality test scores predict our behavior? Explain.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 57 REVIEW

57-1 How do psychologists use traits to describe personality?

- *Trait* theorists see personality as a stable and enduring pattern of behavior. They have been more interested in trying to describe our differences than in explaining them.
- Using factor analysis, they identify clusters of behavior tendencies that occur together. Genetic predispositions influence many traits.

57-2 What are some common misunderstandings about introversion?

- Western cultures prize extraversion, but introverts have different, equally important skills. Introversion does not equal shyness, and extraverts don't always outperform introverts as leaders or in sales success. Introverts often experience great achievement; many introverts prosper.

57-3 What are *personality inventories*, and what are their strengths and weaknesses as trait-assessment tools?

- *Personality inventories* (such as the *MMPI*) are questionnaires on which people respond to items designed to gauge a wide range of feelings and behaviors.
- Test items are *empirically derived*, and the tests are objectively scored. But people can fake their answers to create a good impression; objectivity does not guarantee validity.

57-4 Which traits seem to provide the most useful information about personality variation?

- The Big Five personality factors—conscientiousness, agreeableness, neuroticism, openness, and extraversion (CANOE)—currently offer the clearest picture of personality.

- These factors are stable and appear to be found in all cultures. Many genes, each having small effects, combine to influence our traits, and heritability generally runs about 40 percent for each dimension.

57-5 Does research support the consistency of personality traits over time and across situations?

- A person’s average traits persist over time and are predictable over many different situations. But traits cannot predict behavior in any one particular situation.

Multiple-Choice Questions

1. Which of the following is the best term or phrase for a characteristic pattern of behavior or a disposition to feel and act?

a. Myers-Briggs indicator
b. Factor analysis
c. Introversion
d. Extraversion
e. Trait

2. Jayne refuses to cheat on an exam that many of her friends have shown her copies of. Jayne would rank high on the Big Five trait of

a. conscientiousness.
b. agreeableness.
c. openness.
d. extraversion.
e. neuroticism.

3. Which of the following is best described along a continuum ranging from ruthless and suspicious to helpful and trusting?

a. Conscientiousness

b. Agreeableness
c. Openness
d. Extraversion
e. Neuroticism

4. Which of the following is true based on “Big Five” personality traits research?

a. Highly conscientious people are likely to be evening people or “night owls.”
b. Highly conscientious people get poor grades.
c. Married partners scoring the same on agreeableness are more likely to experience marital dissatisfaction.
d. Introverts are more likely to prefer communicating through email instead of in person.
e. Neuroticism predicts the use of positive-emotion words in text messages.

Practice FRQs

1. Explain one weakness and one strength of the Minnesota Multiphasic Personality Inventory (MMPI).

Answer

1 point: One point for any strength (for example, the MMPI is empirically derived, assesses several traits at once, or is easily scored). Page 599

1 point: One point for any weakness (for example, the MMPI test-taker might not answer honestly, or validity is not guaranteed). Page 599

2. Gustavo has been rated highly on each of the following traits:

- Openness
- Agreeableness
- Extraversion

Provide an example of a behavior for each of the three traits that would indicate that he was correctly rated.

(3 points)

Module 58 Social-Cognitive Theories

LEARNING TARGETS

- 58-1 Describe how social-cognitive theorists view personality development and how they explore behavior.
- 58-2 Discuss the criticisms social-cognitive theorists have faced.

58-1 How do social-cognitive theorists view personality development, and how do they explore behavior?

The **social-cognitive perspective** on personality that Albert Bandura (1986, 2006, 2008) proposed emphasizes the interaction of our traits with our situations. Much as nature and nurture always work together, so do individuals and their situations.

social-cognitive perspective
views behavior as influenced by the interaction between people’s traits (including their thinking) and their social context.

Those who take the **behavioral approach** to personality development emphasize the effects of learning. We are conditioned to repeat certain behaviors, and we learn by observing and imitating others. For example, a child with a very controlling parent may learn to follow orders rather than think independently, and may exhibit a more timid personality.

behavioral approach

focuses on the effects of learning on our personality development.

Social-cognitive theorists do consider the behavioral perspective, believing that we learn many of our behaviors either through conditioning or by observing and imitating others. (That’s the “social” part.) They also emphasize the importance of mental processes: What we *think* about a situation affects our resulting behavior. (That’s the “cognitive” part.) Instead of focusing solely on how our environment *controls* us, as behaviorists do, social-cognitive theorists focus on how we and our environment *interact:* How do we interpret and respond to external events? How do our schemas, our memories, and our expectations influence our behavior patterns?

Reciprocal Influences

Bandura (1986, 2006) views the person-environment interaction as **reciprocal determinism**. “Behavior, internal personal factors, and environmental influences,” he said, “all operate as interlocking determinants of each other” (**Figure 58.1**). We can see this interaction in people’s relationships. For example, Rosa’s past romantic experience (her behaviors) influence her romantic attitudes (internal factor), which affect how she now responds to Ryan (environmental factor).

reciprocal determinism

the interacting influences of behavior, internal cognition, and environment.

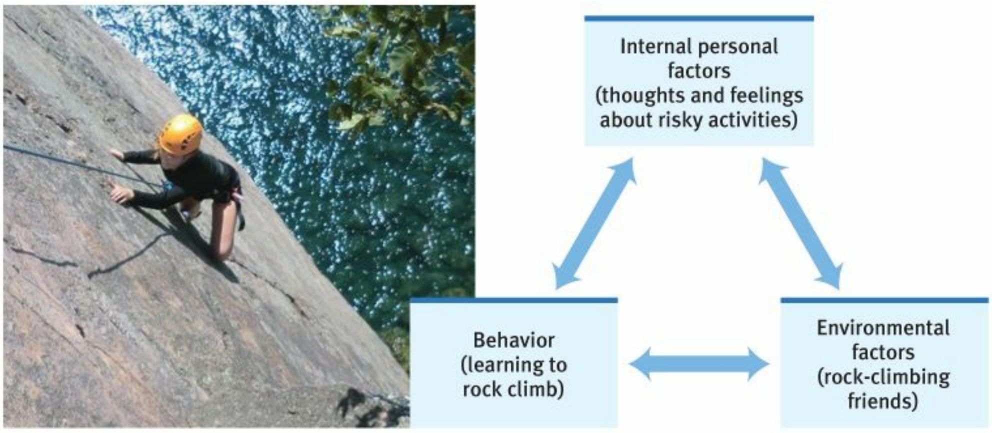

Internal personal factors (thoughts and feelings about risky activities)
Behavior (learning to rock climb)
Environmental factors (rock-climbing friends)

Figure 58.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Courtesy of Joslyn Brugh

Figure 58.1 **Reciprocal determinism**

The social-cognitive perspective proposes that our personalities are shaped by the interaction of our personal traits (including our thoughts and feelings), our environment, and our behaviors.

Flip It Video: Reciprocal Determinism

Consider three specific ways in which individuals and environments interact:

1. ***Different people choose different environments.*** The reading you do,

the shows you watch, the music you listen to, the friends you associate with—all are part of an environment you participated in choosing, based partly on your disposition (Funder, 2009; Ickes et al., 1997). People with inflated self-esteem choose to post frequent selfies in online environments, where they can receive the public attention and praise they crave. This leads to even greater self-love (Halpern et al., 2016). We choose our environment and it then shapes us.

2. ***Our personalities shape how we interpret and react to events.*** Anxious people tend to attend and react strongly to relationship threats (Campbell & Marshall, 2011). If we perceive the world as threatening, we will watch for threats and be prepared to defend ourselves.
3. ***Our personalities help create situations to which we react.*** How we view and treat people influences how they then treat us. If we expect that others will not like us, our bragging and other efforts to seek their approval might cause them to reject us (Scopelliti et al., 2015).

In addition to the interaction of internal personal factors, the environment, and our behaviors, we also experience *gene-environment interaction* (Module 14). Our genetically influenced traits evoke certain responses from others, which may nudge us in one direction or another. In one classic study, those with the interacting factors of (1) having a specific gene associated with aggression, plus (2) being raised in a difficult environment were most likely to demonstrate adult antisocial behavior (Caspi et al., 2002).

In such ways, we are both the products and the architects of our environments: *Behavior emerges from the interplay of external and internal influences.* Boiling water turns an egg hard and a potato soft. A threatening environment turns one person into a hero, another into a scoundrel. Extraverts enjoy greater well-being in an extraverted culture than in an introverted one (Fulmer et al., 2010). *At every moment,* our behavior is influenced by our biology, our social and cultural experiences, and our cognition and dispositions (**Figure 58.2**).

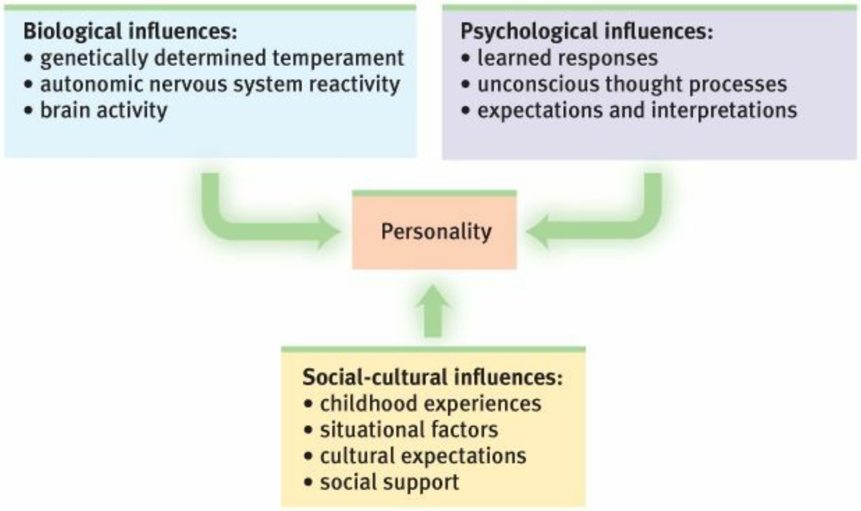

Biological influences:
• genetically determined temperament
• autonomic nervous system reactivity
• brain activity
Psychological influences:
• learned responses
• unconscious thought processes
• expectations and interpretations
Personality
Social-cultural influences:
• childhood experiences
• situational factors
• cultural expectations
• social support

Figure 58.2

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Figure 58.2 The biopsychosocial approach to the study of personality

As with other psychological phenomena, personality is fruitfully studied at multiple levels.

Assessing Behavior in Situations

To predict behavior, social-cognitive psychologists often observe behavior in realistic situations. One ambitious example was the U.S. Army's World War II strategy for assessing candidates for spy missions. Rather than using paper-and-pencil tests, Army psychologists subjected the candidates to simulated undercover conditions. They tested their ability to handle stress, solve problems, maintain leadership, and withstand intense interrogation without blowing their cover. Although time-consuming and expensive, this assessment of behavior in a realistic situation helped predict later success on actual spy missions (OSS Assessment Staff, 1948).

Military and educational organizations and many Fortune 500 companies have adopted assessment center strategies (Bray & Byham, 1991, 1997; Eurich et al., 2009). AT&T has observed prospective managers doing simulated managerial work. Student teachers are observed and evaluated several times during the term they spend in your school. Many colleges assess nursing students' potential by observing their clinical work, and they assess potential faculty members' teaching abilities by observing them teach. Most American cities with populations of 50,000 or more have used assessment centers in evaluating police officers and firefighters (Lowry, 1997).

These procedures exploit the principle that the best means of predicting behavior is neither a personality test nor an interviewer's intuition. Rather, *the best predictor of future behavior is the person's past behavior patterns in similar situations* (Lyons et al., 2011; Mischel, 1981; Schmidt & Hunter, 1998). As long as the situation and the person remain much the same, the best predictor of future job performance is past job performance; the best predictor of future grades is past grades; the best predictor of future aggressiveness is past aggressiveness. If you can't check the person's past behavior, the next best thing is to create an assessment situation that simulates the task so you can see how the person handles it (Lievens et al., 2009; Meriac et al., 2008).

FYI

A *New York Times* analysis of 100 rampage murders over the last half-century revealed that 55 of the killers had regularly exploded in anger and 63 had threatened violence (Goodstein & Glaberson, 2000). Most didn’t, out of the blue, “just snap.”

Evaluating Social-Cognitive Theories

58-2 What criticisms have social-cognitive theorists faced?

Social-cognitive theories of personality sensitize researchers to how situations affect, and are affected by, individuals. More than other personality theories (see **Table 58.1**), they build from psychological research on learning and cognition.

TABLE 58.1 Comparing the Major Personality Theories

Personality Theory	Key Proponents	Assumptions	View of Personality
Psychoanalytic	Freud	Emotional disorders spring from unconscious dynamics, such as unresolved sexual and other childhood conflicts, and fixation at various developmental stages. Defense mechanisms fend off anxiety.	Personality consists of pleasure-seeking impulses (the id), a reality-oriented executive (the ego), and an internalized set of ideals (the superego).
Psychodynamic	Adler, Horney, Jung	The unconscious and conscious minds interact. Childhood experiences and defense mechanisms are important.	The dynamic interplay of conscious and unconscious motives and conflicts shapes our personality.
Humanistic	Rogers, Maslow	Rather than examining the struggles of sick people, it's better to focus on the ways healthy people may strive for self-	If our basic human needs are met, we will strive toward self-actualization. In a climate of unconditional positive regard, we

		realization.	can develop self-awareness and a more realistic and positive self-concept.
Trait	Allport; Eysenck, H.; Eysenck, S.; McCrae; Costa	We have certain stable and enduring characteristics, influenced by genetic predispositions.	Scientific study of traits has isolated important dimensions of personality, such as the Big Five traits (conscientiousness, agreeableness, neuroticism, openness, and extraversion).
Social-Cognitive	Bandura	Our traits interact with the social context to produce our behaviors—a phenomenon called *reciprocal determinism.*	Conditioning and observational learning interact with cognition to create behavior patterns. Our behavior in one situation is best predicted by considering our past behavior in similar situations.

AP® EXAM TIP

Tables 58.1 and 58.2 summarize a whole unit's worth of information. Review research methods and study the tables well to be clear on the distinctions separating the major approaches to personality.

Critics charge that social-cognitive theories focus so much on the situation that they fail to appreciate the person's inner traits. Where is the person in this view of personality, ask the dissenters, and where are human emotions? True, the situation does guide our behavior. But, say the critics, in many instances our unconscious motives, our emotions, and our pervasive traits shine through. Personality traits have been shown to predict behavior at work, in love, and at play. Our biologically influenced traits really do matter. Consider Percy Ray Pridgen and Charles Gill. Each faced the same situation: They had jointly won a $90 million lottery jackpot (Harriston, 1993). When Pridgen learned of the winning numbers, he began trembling uncontrollably, huddled with a friend behind a bathroom door while confirming the win, and then sobbed. When Gill heard the news, he told his wife and went to sleep.

* * *

As we have seen, researchers investigate personality using various methods that serve differing purposes. For a synopsis and comparison of these methods, see **Table 58.2**.

TABLE 58.2 Comparing Research Methods to Investigate Personality

Research Method	**Description**	**Perspectives Incorporating This Method**	**Benefits**	**Weakn**
Case study	In-depth study of one individual.	Psychoanalytic, humanistic	Less expensive than other methods.	May not generaliz the large populatio
Survey	Systematic questioning of a random sample of the population.	Trait, social-cognitive	Results tend to be reliable and can be generalized to the larger population.	May be expensiv correlatic findings.
Projective tests (e.g., TAT and Rorschach)	Ambiguous stimuli designed to trigger projection of inner	Psychodynamic	Designed to get beneath the conscious surface of a person's self-understanding;	Results h weak val and relia

	dynamics.		may be a good ice-breaker.	
Personality inventories, such as the MMPI (to determine scores on Big Five personality factors)	Objectively scored groups of questions designed to identify personality dispositions.	Trait	Generally reliable and empirically validated.	Explore a limited number o traits.
Observation	Studying how individuals react in different situations.	Social-cognitive	Allows researchers to study the effects of environmental factors on the way an individual's personality is expressed.	Results m not apply the larger populatio
Experimentation	Manipulate variables, with random assignment to conditions.	Social-cognitive	Discerns cause and effect.	Some variables cannot feasibly o ethically manipula

✓ Check Your Understanding

Ask Yourself

- Can you think of a recent situation in which your personality led you to react differently than did some classmates who experienced the same event?

Test Yourself

- Albert Bandura proposed the _______________-_______________ perspective on personality, which emphasizes the interaction of people with their environment. To describe the interacting influences of behavior, thoughts, and environment, he used the term ________________ ________________.

- What is the best way to predict a person’s future behavior?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 58 REVIEW

58-1 How do social-cognitive theorists view personality development, and how do they explore behavior?

- Albert Bandura first proposed the *social-cognitive perspective*, which views personality as the product of the interaction between a person’s traits (including thinking) and the situation—the social world around us.
- The *behavioral approach* contributes an understanding that our personality development is affected by learned responses.
- Social-cognitive researchers apply principles of learning, as well as cognition and social behavior, to personality.
- *Reciprocal determinism* describes the interaction and mutual influence of behavior, internal personal factors, and environmental factors.
- Assessment situations involving simulated conditions exploit the principle that the best predictor of future behavior is a person’s behavior patterns in similar situations.

58-2 What criticisms have social-cognitive theorists faced?

- Social-cognitive theories of personality build on well-established concepts of learning and cognition, and sensitize researchers to how situations affect, and are affected by, individuals.
- Social-cognitive theorists have been faulted for underemphasizing the importance of unconscious motives, emotions, and biologically influenced traits.

Multiple-Choice Questions

1. Who of the following is considered the leading advocate of personality’s social-cognitive approach?

a. Gordon Allport

   b. Carl Jung
   c. Karen Horney
   d. Carl Rogers
   e. Albert Bandura

2. The way we explain negative and positive events is called

   a. personal control.
   b. reciprocal determinism.
   c. self-efficacy.
   d. attribution.
   e. situational assessment.

3. Which of the following is an example of an assessment likely to be used by a social-cognitive psychologist?

   a. A student teacher is formally observed and evaluated in the classroom.
   b. A person applying for a managerial position takes the Myers-Briggs Type Indicator.
   c. A defendant in a criminal case is interviewed by a court-appointed psychologist.
   d. In a pre-marriage counseling session, a young couple responds to ambiguous inkblots.
   e. A depressed young man is asked by his therapist to relax on a couch and talk about whatever comes to mind.

Practice FRQs

1. Heidi is an avid reader. Explain how Heidi’s desire to read may be supported by the following elements of reciprocal determinism:

- Internal factors
- Environmental factors
- Behavioral factors

Answer

1 point: Internal factors that cause Heidi to enjoy reading might include her verbal aptitude or her curiosity. Page 606

1 point: Environmental factors that cause Heidi to enjoy reading might include having grown up in a family where reading was valued and encouraged. Page 606

1 point: Behavioral factors that cause Heidi to enjoy reading might include the pleasure she gets from reading, which further reinforces her desire to read. Page 606

2. Explain the main criticism of social-cognitive theories and one main support for this approach.

(2 points)

Module 59 Exploring the Self

LEARNING TARGETS

- 59-1 Explain why psychology has generated so much research on the self, and discuss the importance of self-esteem to our well-being.
- 59-2 Describe how excessive optimism, blindness to one's own incompetence, and self-serving bias reveal the costs of self-esteem, and explain how defensive and secure self-esteem differ.
- 59-3 Discuss how individualist and collectivist cultures differ in their values and goals.

59-1 Why has psychology generated so much research on the self? How important is self-esteem to our well-being?

Our personality feeds our sense of self. Asked to consider "Who I am," people draw on their distinctive and enduring ways of thinking, feeling, and acting. Psychology's concern with our sense of self dates back at least to William James, who devoted more than 100 pages of his 1890 *Principles of Psychology* to the topic. By 1943, Gordon Allport lamented that the self had become "lost to view." Although humanistic psychology's later emphasis on the self did not instigate much scientific research, it did help renew the concept of self and keep it alive. Now, more than a century after James, the self is one of Western psychology's most vigorously researched topics. Every year, new studies galore appear on self-esteem, self-disclosure, self-awareness, self-schemas, self-monitoring, and more. Even neuroscientists have searched for the self, by identifying a central frontal lobe region that activates when people respond to self-reflective questions about their traits and dispositions (Damasio, 2010; Mitchell, 2009; Pauly et al., 2013). The **self**, as organizer of our thoughts, feelings, and actions, occupies the center of personality.

self

in contemporary psychology, assumed to be the center of personality, the organizer of our thoughts, feelings, and actions.

One example of thinking about self is the concept of *possible selves* (Markus & Nurius, 1986; Rathbone et al., 2016). Your possible selves include your visions of the self you dream of becoming—the rich self, the successful self, the loved and admired self. Your possible selves also include the self you fear becoming—the unemployed self, the academically failed self, the lonely and unpopular self. Possible selves motivate us to lay out specific goals that direct our energy effectively and efficiently (Landau, M. J. et al., 2014). Middle school students whose families struggle financially are more likely to earn high grades if they have a clear vision of themselves succeeding in school (Duckworth et al., 2013). Dreams often do give birth to achievements.

Neil Collins/Alamy

Possible selves By giving them a chance to try out many possible selves, pretend games offer children important opportunities to develop emotionally, socially, and cognitively. This young girl may or may not grow up to be a physician, but playing various adult roles will expand her vision of what she might become.

> “*The first step to better times is to imagine them.*”
>
> *Chinese fortune cookie*

Our self-focused perspective may motivate us, but it can also lead us to presume too readily that others are noticing and evaluating us. One researcher demonstrated this **spotlight effect** by having Cornell University students don T-shirts featuring soft-rock singer Barry Manilow before entering a room with other students (Gilovich, 1996). Feeling self-conscious, the T-shirt wearers guessed that nearly half their peers would take note of the shirt as they walked in. In reality, only 23 percent did. The point to remember: *We stand out less than we imagine,* even with dorky clothes and bad hair, and even after a blunder like setting off a library alarm (Gilovich & Savitsky, 1999; Savitsky et al., 2001).

spotlight effect

overestimating others’ noticing and evaluating our appearance, performance, and blunders (as if we presume a spotlight shines on us).

To turn down the spotlight’s brightness, we can use two strategies. The first is simply to know and remember the spotlight effect. Public speakers perform better if they understand that their natural nervousness is hardly noticeable (Savitsky & Gilovich, 2003). The second is to take the audience’s perspective. When we imagine audience members empathizing with our situation, we tend to expect we will not be judged as harshly (Epley et al., 2002).

Trinity Mirror/Mirrorpix/Alamy Tim Large /Shutterstock

The Benefits of Self-Esteem

Self-esteem—our feelings of high or low self-worth—matters. So does **self-efficacy**, our sense of competence on a task (Bandura, 1977). (A student might feel high self-efficacy in a math class yet low overall self-esteem.) People who feel good about themselves (who strongly agree with self-affirming questionnaire statements, such as "I am fun to be with") have fewer sleepless nights. They succumb less easily to pressures to conform. They make more positive Facebook posts, causing others to like them more (Forest & Wood, 2012). They are more persistent at difficult tasks. They feel less shy, anxious, and lonely, and are just plain happier (Greenberg, 2008; Orth & Robins, 2014; Swann et al., 2007). If feeling bad, they think they deserve better and thus make more effort to repair their mood (Wood et al., 2009). Our self-esteem grows from venturesome experiences and achievement, and therefore changes as we age (Hutteman et al., 2015). In one study of nearly 1 million people across 48 nations, self-esteem increased from adolescence to middle adulthood (Bleidorn et al., 2016).

self-esteem

one's feelings of high or low self-worth.

self-efficacy

one's sense of competence and effectiveness.

But is high self-esteem the horse or the cart? Is it really "the armor that protects kids" from life's problems (McKay, 2000)? Some psychologists have their doubts (Baumeister, 2006; Seligman, 1994, 2002). Children's academic self-efficacy—their confidence that they can do well in a subject—predicts school achievement. But general self-image does not (Marsh & Craven, 2006; Swann et al., 2007; Trautwein et al., 2006). Maybe self-esteem simply reflects reality. Maybe it's a side effect of meeting challenges and surmounting difficulties. Maybe self-esteem is a gauge that reports the state of our relationships with others (Reitz et al., 2016). If so, isn’t pushing the gauge artificially higher with empty compliments much like forcing a car’s low fuel gauge to display “full”?

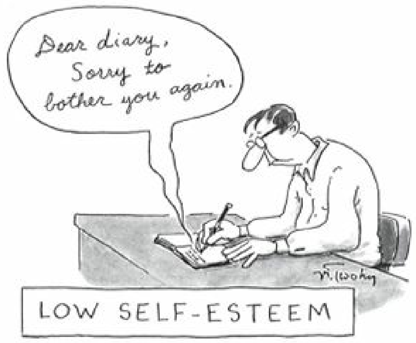
AP® EXAM TIP

Note the difference between *self-esteem* and *self-efficacy*. Although your feeling of self-worth might be related to your beliefs about how competent you are, they are not the same thing.

If feeling good *follows* doing well, then giving praise in the absence of good performance may actually harm people. After receiving weekly self-esteem-boosting messages, struggling students earned *lower*-than-expected grades (Forsyth et al., 2007). Other research showed that giving people random rewards hurt their productivity. Martin Seligman (2012) reported that “when good things occurred that weren’t earned, like nickels coming out of slot machines, it did not increase people’s well-being. It produced helplessness. People gave up and became passive.”

> “*When kids increase in self-control, their grades go up later. But when kids increase their self-esteem, there is no effect on their grades.*”
>
> *Angela Duckworth,* In Character interview, *2009*

There is, however, an important *effect* of low self-esteem. When researchers temporarily deflated people’s self-image (by telling them they did poorly on an aptitude test or by disparaging their personality), those participants became more likely to disparage others or to express heightened racial prejudice (van Dijk et al., 2011; vanDellen et al., 2011; Ybarra, 1999). Self-image threat even increases unconscious racial bias (Allen & Sherman, 2011). Those who are negative about themselves have also tended to be oversensitive and judgmental (Baumgardner et al., 1989; Pelham, 1993). Self-esteem threats also lead people to spend more time with their online profiles—safe havens in which to rebuild their self-worth (Toma & Hancock, 2013). Such findings are consistent with humanistic psychology’s ideas about the benefits of a healthy self-image. Accept yourself and you’ll find it easier to accept others. Disparage yourself and you will be prone to the floccinaucinihilipilification[1] of others. Said more simply, some “love their neighbors as themselves”; others loathe their neighbors as themselves. People who are down on themselves tend to be down on others.



Mike Twohy/The New Yorker Collection
/The Cartoon Bank

The Costs of Self-Esteem

59-2 How do excessive optimism, blindness to one’s own incompetence, and self-serving bias reveal the costs of self-esteem, and how do defensive and secure self-esteem differ?

Excessive Optimism

Positive thinking in the face of adversity can pay dividends, but so, too, can a dash of realism (Schneider, 2001). Realistic anxiety over possible future failures can fuel energetic efforts to avoid the dreaded fate (Goodhart, 1986; Norem, 2001; Showers, 1992). Concerned about failing an upcoming test, students may study thoroughly and outperform their equally able but more confident peers. Asian-American students have expressed somewhat greater pessimism than their European-American counterparts, which may help explain their often impressive academic achievements (Chang, 2001). Success requires enough optimism to provide hope and enough pessimism to prevent complacency. We want our airline pilots to be mindful of worst-possible outcomes.

Excessive optimism can blind us to real risks (Tenney et al., 2015). More than 1000 studies have shown how our natural positive thinking bias can promote “an unrealistic optimism about future life events” (Shepperd et al., 2015; Weinstein, 1980). When 56 percent of twelfth graders believed they would earn a graduate degree—though only 9 percent were likely to do so—that was unrealistic optimism (Reynolds et al., 2006). When most students perceived themselves as more likely than their classmates to get a high-paying job and own a nice home, and less likely to have a heart attack or get cancer, that, too, was unrealistic optimism (Waters et al., 2011). If overconfident of our ability to control an impulse such as the urge to smoke, we are more likely to expose ourselves to temptations—and to fail (Nordgren et al., 2009). Blind optimism can be self-defeating, as we can see in those who optimistically deny the addictive toxicity of smoking or venture into ill-fated relationships.

Our natural positive thinking bias does seem to vanish, however, when we are bracing ourselves for feedback, such as test results (Carroll et al., 2006). In one analysis of 71 studies, optimism morphed toward pessimism shortly before the moment of truth (Sweeny & Krizan, 2013). Positive illusions also vanish after a traumatic personal experience—as they did for victims of a catastrophic California earthquake, who had to give up their illusions of being less vulnerable than others to earthquakes (Helweg-Larsen, 1999).

Blindness to One’s Own Incompetence

Ironically, people often are most overconfident when most incompetent. That, said Justin Kruger and David Dunning (1999), is because it often takes competence to recognize competence. They found that most students scoring at the low end of grammar and logic tests believed they had scored in the top half. If you do not know what is logical, you may be unaware of your illogic. This “ignorance of one’s own incompetence” phenomenon—now called the *Dunning-Kruger effect*—can produce overconfidence among political leaders. It also has a parallel among those of us with hearing loss, as I [DM] can confirm. Because we are unaware of what we don’t hear, we may overestimate our hearing. If I fail to hear my friend calling my name, the friend notices my inattention. But for me it’s a nonevent. I hear what I hear—which, to me, seems pretty normal.

The difficulty in recognizing one’s own incompetence helps explain why so many low-scoring students are dumbfounded after blowing a big test. If you don’t know all the Scrabble word possibilities you’ve overlooked, you may feel pretty smart—until they are pointed out. Our ignorance of what we don’t know sustains our self-confidence, leading us to make the same mistakes (Williams et al., 2013).

To judge one’s competence and predict one’s future performance, it pays to invite others’ assessments (Dunning, 2006; Grossmann & Kross, 2014). Based on studies in which both individuals and their acquaintances predict their future, we can hazard some advice: Ask your peers for their candid prediction. If you’re in love and want to predict whether it will last, don’t listen to your heart—ask your friends.

Self-Serving Bias

Imagine dashing to class, hoping not to miss the first few minutes. But you arrive five minutes late, huffing and puffing. As you sink into your seat, what sorts of thoughts go through your mind? Do you go through a negative door, thinking “I’m such a loser”? Or do you go through a positive door, telling yourself “I really tried to get here on time”?

Personality psychologists have found that most people choose the second door, which leads to positive self-thoughts. We have a good reputation with ourselves. We show a **self-serving bias**—a readiness to perceive ourselves favorably (Myers, 2010). Consider:

self-serving bias

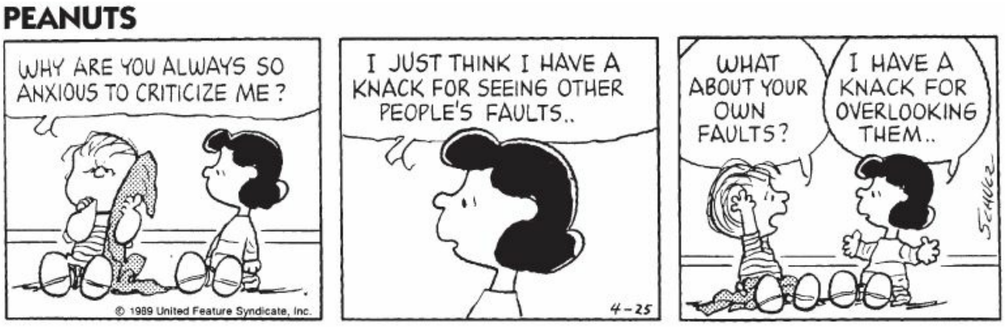
a readiness to perceive oneself favorably.

People accept more responsibility for good deeds than for bad, and for successes than for failures. Athletes often privately credit their victories to their own prowess, and their losses to bad breaks, lousy officiating, or the other team’s exceptional performance. Most students who receive poor test grades criticize the test or the teacher, not themselves. Drivers filling out insurance forms have explained their accidents in such words as “A pedestrian hit me and went under my car.” The question “What have I done to deserve this?” is one we usually ask of our troubles, not our successes. Although a self-serving bias can lead us to avoid uncomfortable truths, it can also motivate us to approach difficult tasks with confidence instead of despair (Tomaka et al., 1992; von Hippel & Trivers, 2011).

> “*I never blame myself when I’m not hitting. I just blame the bat and if it keeps up, I change bats.*”
>
> *Baseball great Yogi Berra*

Most people see themselves as better than average. Compared with most other people, how moral are you? How easy to get along with? Where would you rank yourself, from the 1st to the 99th percentile? Most people put themselves well above the 50th percentile. This better-than-average effect appears for nearly any subjectively assessed and socially desirable behavior. Some examples:

- In U.S. surveys, most business executives say they are more ethical than their average counterpart. In several studies, 90 percent of business managers and more than 90 percent of college professors also rated their performance as superior to that of their average peer.
- In Australia, 86 percent of people rate their job performance as above average, and only 1 percent as below average.
- In the U.S. National Survey of Families and Households, 49 percent of men said they provided half or more of the child care, though only 31 percent of their wives or partners saw things that way (Galinsky et al., 2008).


PEANUTS
WHY ARE YOU ALWAYS SO ANXIOUS TO CRITICIZE ME?
© 1989 United Feature Syndicate, Inc.
I JUST THINK I HAVE A KNACK FOR SEEING OTHER PEOPLE'S FAULTS..
4-25
WHAT ABOUT YOUR OWN FAULTS?
I HAVE A KNACK FOR OVERLOOKING THEM..
SCHULZ

Andrews McMeel Syndication

Self-serving bias reflects both an overestimation of the self and a desire to maintain a positive self-view (Brown, 2012; Epley & Dunning, 2000). This motivation to see ourselves positively is weaker in Asia, where people tend to value modesty (Church et al., 2014; Falk, C. F. et al., 2009). Yet self-serving biases have been observed worldwide: In every one of 53 countries surveyed, people expressed self-esteem above the midpoint of the most widely used scale (Schmitt & Allik, 2005). The world, it seems, is Garrison Keillor’s Lake Wobegon writ large—a place where “all the women are strong, all the men are good-looking, and all the children are above average."

> “*If you are like most people, then like most people, you don’t know you’re like most people. Science has given us a lot of facts about the average person, and one of the most reliable of these facts is the average person doesn’t see herself as average.*”
>
> *Daniel Gilbert*, Stumbling on Happiness, *2006*

Finding their self-esteem threatened, people with large egos may react violently. Researchers Brad Bushman and Roy Baumeister (1998; Bushman et al., 2009) had undergraduate volunteers write a brief essay, in response to which another supposed student gave them either praise ("Great essay!") or stinging criticism ("One of the worst essays I have read!"). The essay writers were then allowed to lash out at their evaluators by blasting them with unpleasant noise. Can you anticipate the result?

After criticism, those with inflated self-esteem were "exceptionally aggressive." They delivered a three times greater noise blast than did those with normal self-esteem. Over 80 follow-up studies have replicated the dangerous effect of **narcissism** (excessive self-love and self-focus) on aggression (Rasmussen, 2016). Researchers have concluded that "conceited, self-important individuals turn nasty toward those who puncture their bubbles of self-love" (Baumeister, 2001).

narcissism

excessive self-love and self-absorption.

After tracking self-importance across several decades, psychologist Jean Twenge (2014; Twenge & Foster, 2010) reported that what she called *Generation Me*—born in the 1980s and early 1990s—expressed more narcissism (by agreeing more often with statements such as, "If I ruled the world, it would be a better place," or "I think I am a special person"). Why does a rise in narcissism matter? Narcissists tend to be materialistic, desire fame, have inflated expectations, hook up more often without commitment, and gamble and cheat more—all of which have been increasing as narcissism has increased. Narcissistic people (more often men) forgive others less, take a game-playing approach to their romantic relationships, and engage in sexually forceful behavior (Blinkhorn et al., 2015; Bushman et al., 2003; Grijalva et al., 2015). They crave adulation, are active on social media, and often become enraged when criticized (Geukes et al., 2016; Krizan & Johar, 2015; McCain & Campbell, 2017). Many had parents who told them they were superior to others (Brummelman et al., 2015). They typically make good first impressions, which wane over time as their arrogance and bragging gets old (Czarna et al., 2016; Leckelt et al., 2015). Reality television stars are especially narcissistic (Rubinstein, 2016; Young & Pinsky, 2006).

> “*The enthusiastic claims of the self-esteem movement mostly range from fantasy to hogwash. The effects of self-esteem are small, limited, and not all good.*”
>
> *Roy Baumeister (1996)*

Despite the demonstrated perils of pride, many people object that the idea of self-serving bias overlooks those who feel worthless and unlovable. If self-serving bias prevails, why do so many people disparage themselves? For four reasons: (1) Sometimes self-directed put-downs are *subtly strategic*—they elicit reassuring strokes. Saying “No one likes me” may at least elicit “But not everyone has met you!” (2) Other times, such as before a game or a test, self-disparaging comments *prepare us for possible failure.* The coach who extols the superior strength of the upcoming opponent makes a loss understandable, a victory noteworthy. (3) A self-disparaging “How could I have been so stupid!” also helps us *learn from our mistakes.* (4) Self-disparagement frequently *pertains to one’s old self.* Asked to remember their really bad behaviors, people recall things from long ago; good behaviors more easily come to mind from their recent past (Escobedo & Adolphs, 2010). Even when they have not changed, people are much more critical of their distant past selves than of their current selves (Wilson & Ross, 2001). “At 14, I was a jerk; today I’m more sensitive.” In their own eyes, chumps yesterday, champs today.

> “*If you compare yourself with others, you may become vain and bitter; for always there will be greater and lesser persons than yourself.*”
>
> *Max Ehrmann, “Desiderata,” 1927*

Even so, all of us some of the time (and some of us much of the time) do feel inferior. This is especially true when we compare ourselves with those who are a step or two higher on the ladder of status, looks, income, or ability. Olympians who win silver medals, barely missing gold, show greater sadness on the awards podium compared with the bronze medal winners (Medvec et al., 1995). The deeper and more frequently we have such feelings, the more unhappy or even depressed we become. But for most people, thinking has a naturally positive bias.

While recognizing the dark side of excessive self-esteem, some researchers identify two types of self-esteem—defensive and secure (Kernis, 2003; Lambird & Mann, 2006; Ryan & Deci, 2004). *Defensive self-esteem* is fragile. It focuses on sustaining itself, which makes failure and criticism feel threatening. Defensive people may respond to such perceived threats with anger or aggression (Crocker & Park, 2004; Donnellan et al., 2005).

Secure self-esteem is less fragile, because it is less contingent on external evaluations. To feel accepted for who we are, and not for our looks, wealth, or acclaim, relieves pressures to succeed and enables us to focus beyond ourselves. By losing ourselves in relationships and purposes larger than ourselves, we may achieve a more secure self-esteem, satisfying relationships, and greater quality of life (Crocker & Park, 2004). Authentic pride, rooted in actual achievement, supports self-confidence and leadership (Tracy et al., 2009; Weidman et al., 2016; Williams & DeSteno, 2009).

> “*True humility is not thinking less of yourself; it is thinking of yourself less.*”

C. S. Lewis, Mere Christianity, *1952*

✓ Check Your Understanding

Ask Yourself

- What possible selves do you dream of—or fear—becoming? To what extent do these imagined selves motivate you now?

Test Yourself

- What are the positive and negative effects of high self-esteem?
- The tendency to accept responsibility for success and blame circumstances or bad luck for failure is called _______________- _______________ _______________ .
- _______________ (Secure/Defensive) self-esteem is linked to angry and aggressive behavior. _______________ (Secure/Defensive) self-esteem is a healthier self-image that allows us to focus beyond ourselves and enjoy a higher quality of life.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Culture and the Self

Flip It Video: Individualist and Collectivist Cultures

59-3 How do individualist and collectivist cultures differ in their values and goals?

Imagine that someone ripped away your social connections, making you a solitary refugee in a foreign land. How much of your identity would remain intact?

If you are an **individualist**, a great deal. You would have an independent sense of “me,” and an awareness of your unique personal convictions and values. Individualists prioritize personal goals. They define their identity mostly in terms of personal traits. They strive for personal control and individual achievement.

individualism

giving priority to one’s own goals over group goals and defining one’s identity in terms of personal attributes rather than group identifications.

Individualists do share the human need to belong. They join groups. But they are less focused on group harmony and doing their duty to the group (Brewer & Chen, 2007). Being more self-contained, individualists move in and out of social groups more easily. They feel relatively free to switch places of worship, change jobs, or even leave their extended families and migrate to a new place. Marriage is often for as long as they both shall love.

The New Yorker Collection, 2000, Jack Ziegler from cartoonbank.com.
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If set adrift in a foreign land as a **collectivist**, you might experience a greater loss of identity. Cut off from family, groups, and loyal friends, you would lose the connections that have defined who you are. *Group identifications* provide a sense of belonging, a set of values, and an assurance of security. Collectivists have deep attachments to their groups—their family, clan, or company. Elders receive respect. For example, the *Law of the People's Republic of China on Protection of the Rights and Interests of the Elderly* states that parents aged 60 or above can sue their sons and daughters if they fail to provide "for the elderly, taking care of them and comforting them, and cater[ing] to their special needs."

collectivism

giving priority to the goals of one's group (often one's extended family or work group) and defining one's identity accordingly.

Kyodo/Reuters/Newscom

Considerate collectivists Japan’s collectivist values, including duty to others and social harmony, were on display after the devastating 2011 earthquake and tsunami. Virtually no looting was reported, and residents remained calm and orderly, as shown here while waiting for drinking water.

Collectivists are like athletes who take more pleasure in their team’s victory than in their own performance. They find satisfaction in advancing their groups’ interests, even at the expense of personal needs. They preserve group spirit by avoiding direct confrontation, blunt honesty, and uncomfortable topics. They value humility, not self-importance (Bond et al., 2012). Instead of dominating conversations, collectivists hold back and display shyness when meeting strangers (Cheek & Melchior, 1990). Given the priority on “we,” not “me,” that individualized North American latte—“skinny, extra hot, no-foam”—might sound selfishly demanding in Seoul (Kim & Markus, 1999).

A question: What do you think of people who willingly change their behavior to suit different people and situations? People in individualist countries (the United States and Brazil) typically describe them as “dishonest,” “untrustworthy,” and “insincere” (Levine, 2016). In traditionally collectivist countries (China, India, and Nepal), people more often describe them as “mature,” “honest,” “trustworthy,” and “sincere.”

> “*One needs to cultivate the spirit of sacrificing the little me to achieve the benefits of the big me.*”

Chinese saying

To be sure, there is also diversity *within* cultures. Within many countries, there are also distinct subcultures related to one's religion, economic status, and region (Cohen, 2009). In China, greater collectivist thinking occurs in provinces that have produced rice, a difficult-to-grow crop that involves cooperation to sustain irrigation (Talhelm et al., 2014). In collectivist Japan, a spirit of individualism marks the "northern frontier" island of Hokkaido (Kitayama et al., 2006). And even in the most individualist countries, people have some collectivist values. But in general, people (especially men) in competitive, individualist cultures have more personal freedom, are less geographically bound to their families, enjoy more privacy, and take more pride in personal achievements (**Table 59.1**).

TABLE 59.1 Value Contrasts Between Individualism and Collectivism

Concept	**Individualism**	**Collectivism**
Self	Independent (identity from individual traits)	Interdependent (identity from belonging to groups)
Life task	Discover and express one's uniqueness	Maintain connections, fit in, perform role
What matters	Me—personal achievement and fulfillment; rights and liberties; self-esteem	Us—group goals and solidarity; social responsibilities and relationships; family duty
Coping method	Change reality	Accommodate to reality
Morality	Defined by the individual (self-based)	Defined by social networks (duty-based)
Relationships	Many, often temporary or casual; confrontation acceptable	Few, close and enduring; harmony is valued
Attributing behavior	Behavior reflects the individual's personality and	Behavior reflects social norms and roles

	attitudes	

Information from Thomas Schoeneman (1994) and Harry Triandis (1994).

"I'D LIKE A DECAFFACINNO FRAPPA CHAPPA DAPPA DINGO ICE BLENDED LAST OF THE MOCCA-HICANS VANILLA ICE ICE BETTER LATTE´ THAN NEVER SMOOTHIE WITH A SHOT OF SELF-EXPRESSO."
hickerson

The tolerance of a Starbucks barista is severely tested.

Cartoon by Buddy Hickerson

Individualists even prefer unusual names, as psychologist Jean Twenge noticed while seeking a name for her first child. When she and her colleagues (2010, 2016) analyzed the first names of 358 million American babies born between 1880 and 2015, they discovered that the most common baby names had become less common. As **Figure 59.1** illustrates, the percentage of boys and girls given one of the 10 most common names for their birth year has plunged. Collectivist Japan provides a contrast: Half of Japanese baby names are among the country's 10 most common names (Ogihara et al., 2015).

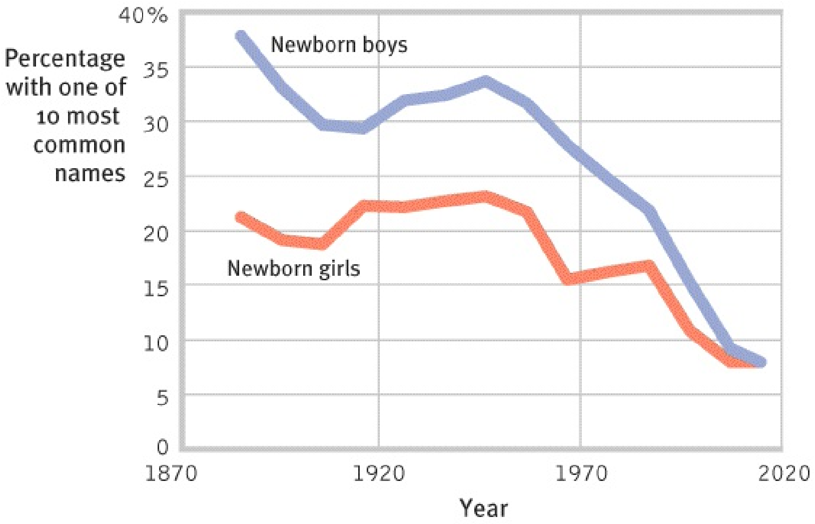

Figure 59.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Twenge et al., 2010, 2016.

Figure 59.1 A child like no other

Americans' individualist tendencies are reflected in their choice of names for their babies. In recent years, the percentage of American babies receiving one of that year's 10 most common names has plunged.

The individualist-collectivist divide appeared in reactions to medals received during the 2000 and 2002 Olympic games. U.S. gold medal winners and the U.S. media covering them attributed the achievements mostly to the athletes themselves (Markus et al., 2006). "I think I just stayed focused," explained swimming gold medalist Misty Hyman. "It was time to show the world what I could do." Japan's gold medalist in the women's marathon, Naoko Takahashi, had a different explanation: "Here is the best coach in the world, the best manager in the world, and all of the people who support me—all of these things . . . became a gold medal."

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Corporation

Sam Harrel/Fairbanks/AK/U.S./ZUMA Press/Newscom

Collectivist culture Although the United States is largely individualist, many cultural subgroups remain collectivist. This is true for many Alaska Natives, who demonstrate respect for tribal elders, and whose identity springs largely from their group affiliations.

Individualists demand romance and personal fulfillment in marriage (Dion & Dion, 1993). In one survey, "keeping romance alive" was rated as important to a good marriage by 78 percent of U.S. women but only 29 percent of Japanese women (*American Enterprise*, 1992). In China, love songs have often expressed enduring commitment and friendship (Rothbaum & Tsang, 1998): "We will be together from now on. . . . I will never change from now to forever."

> "*I used to subscribe to People. Then I switched to Us. Now I just read Self.*"
>
> *Lenny, quoted by Robert Levine,* Stranger in the Mirror: The Scientific Search for Self, *2016*

As cultures evolve, some trends weaken and others grow stronger. Individualism and independence have been fostered by voluntary emigration, a capitalist economy, and a sparsely populated, challenging environment (Kitayama et al., 2009, 2010; Varnum et al., 2010). In Western cultures, individualism has increased strikingly over the last century, following closely on the heels of increasing affluence (Grossmann & Varnum, 2015). This trend reached a new high in 2013 and 2014, when U.S. high school and college students reported increased acceptance of diversity, but also the greatest-ever interest in obtaining benefits for themselves and the lowest-ever willingness to donate to charity (Twenge, 2016; Twenge et al., 2012).

✓ Check Your Understanding

Ask Yourself

- Which concept best describes you—collectivist or individualist? Do you fit completely in either category, or are you sometimes a collectivist and sometimes an individualist?

Test Yourself

- How do people in individualist and collectivist cultures differ?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 59 REVIEW

59-1 Why has psychology generated so much research on the self? How important is self-esteem to our well-being?

- The *self* is the center of personality, organizing our thoughts, feelings, and actions.
- Considering possible selves helps motivate us toward positive development, but focusing too intensely on ourselves can lead to the *spotlight effect.*
- High *self-esteem* is beneficial, but unrealistically high self-esteem is dangerous (linked to aggressive behavior) and fragile. *Self-efficacy* is our sense of competence.
- Rather than unrealistically promoting children's feelings of self-worth, it is better to reward their achievements, which leads to feelings of competence.

59-2 How do excessive optimism, blindness to one's own incompetence, and self-serving bias reveal the costs of self-esteem, and how do defensive and secure self-esteem differ?

- Excessive optimism can lead to complacency and prevent us from seeing real risks, while blindness to one's own incompetence may lead us to make the same mistakes repeatedly.
- *Self-serving bias* is our normal tendency to perceive ourselves favorably, as when viewing ourselves as better than average or when accepting credit for our successes but not blame for our failures.
- *Narcissism* is excessive self-love and self-absorption.
- Defensive self-esteem is fragile, focuses on sustaining itself, and views failure or criticism as a threat. Secure self-esteem is sturdy, enabling us to feel accepted for who we are.

59-3 How do individualist and collectivist cultures differ in their values and goals?

- Although individuals vary, different cultures tend to emphasize either individualism or collectivism.
- Cultures based on self-reliant *individualism* tend to value personal independence and individual achievement. They define identity in terms of self-esteem, personal goals and attributes, and personal rights and liberties.
- Cultures based on socially connected *collectivism* tend to value group goals, social identity, and commitments. They define identity in terms of interdependence, tradition, and harmony.

Multiple-Choice Questions

1. Which of the following is an example of self-efficacy?

a. Manuela believes others are always watching her.
b. Abraham believes he is a good person.
c. Rasheed has placed in skating competitions, which makes him believe that he is a competent skater.
d. Saundra believes it rained because she’s been wishing for rain for days.
e. Igor maintains his optimism despite doing poorly in his math class.

2. Which of the following is most likely to be true of a person from an individualist culture?

a. His behavior would be a reflection of his personality and attitudes.
b. He would choose a career based on the needs of his community.
c. He would view his life task as fitting in and maintaining connections.
d. He would strive to develop a few close and enduring relationships.
e. He would focus on his duty to his family.

3. Karl was late to his interview because he left the house late and did not use his GPS for directions. If Karl is making use of the self-serving bias, which of the following statements will he use to explain his lateness?

a. “I thought I knew where I was going, but I got lost.”
b. “I spent too much time trying to find a tie that matched this shirt.”
c. “My GPS told me to turn left when I should have turned right.”
d. “I am usually right in predicting how long it takes me to get places, but today there was more traffic than I anticipated.”
e. “Sometimes I procrastinate and do not leave enough time to get places.”

Practice FRQs

1. Walking out of his AP® psychology exam, Dwight told his friends, “I did so well, they might just have to give me a 6!” Explain how each of the following might be involved in Dwight’s statement.

- Self-efficacy
- Self-esteem
- Self-serving bias

Answer

1 point: Self-efficacy would be involved if Dwight had proven readiness for the AP® exam—for example if he had done well on his teacher’s tests during the year. Page 612

1 point: Self-esteem would be involved if Dwight, in general, feels good about himself. Page 612

1 point: The self-serving bias may cause Dwight to assume he will do better than most even if he wasn’t well prepared. Page 614

2. Troy has decided to move from the United States to Japan. Describe two cultural elements that will be different for Troy when he moves.

(2 points)

UNIT X REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

personality, p. 578
psychodynamic theories, p. 578
psychoanalysis, p. 579
unconscious, p. 579
free association, p. 579
id, p. 580
ego, p. 580
superego, p. 580
psychosexual stages, p. 580
Oedipus [ED-uh-puss] complex, p. 580
identification, p. 581
fixation, p. 581
defense mechanisms, p. 581
repression, p. 581
collective unconscious, p. 583
projective test, p. 584
Thematic Apperception Test (TAT), p. 584
Rorschach inkblot test, p. 584
terror-management theory, p. 588
humanistic theories, p. 591
hierarchy of needs, p. 591
self-actualization, p. 591
self-transcendence, p. 591
unconditional positive regard, p. 592
self-concept, p. 592
trait, p. 596

personality inventory, p. 598
Minnesota Multiphasic Personality Inventory (MMPI), p. 598
empirically derived test, p. 599
social-cognitive perspective, p. 606
behavioral approach, p. 606
reciprocal determinism, p. 606
self, p. 611
spotlight effect, p. 611
self-esteem, p. 612
self-efficacy, p. 612
self-serving bias, p. 614
narcissism, p. 615
individualism, p. 616
collectivism, p. 616

KEY CONTRIBUTORS TO REMEMBER

Sigmund Freud, p. 578
Alfred Adler p. 583
Karen Horney, p. 583
Carl Jung, p. 583
Abraham Maslow, p. 591
Carl Rogers, p. 591
Robert McCrae, pp. 599
Paul Costa, pp. 599
Albert Bandura, p. 606

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. A question on the Minnesota Multiphasic Personality Inventory

(MMPI) such as “I get angry sometimes” is included to determine what about the test-taker?

- a. Whether the person has a personality disorder
- b. If the person needs immediate help for anger management
- c. If the person is more extraverted than introverted
- d. Whether the person has a stronger id or superego
- e. If the person is answering the questions truthfully

2. Albert Bandura proposed the social-cognitive perspective, which

- a. emphasizes the interaction of our traits with our situations.
- b. predicts human behavior.
- c. focuses on how our environment controls us.
- d. describes our personality using five main traits.
- e. explains the role of the inferiority complex in our behaviors.

3. According to Sigmund Freud, which of the following defense mechanisms buries threatening or upsetting events in the unconscious?

- a. Regression
- b. Displacement
- c. Repression
- d. Reaction formation
- e. Projection

4. Athletes who often privately credit their victories to their own abilities, and their losses to bad breaks, lousy officiating, or the other team’s exceptional performance, are exhibiting which psychological concept?

- a. A low self-esteem
- b. The self-serving bias
- c. Pessimism
- d. The spotlight effect
- e. Incompetence

5. Which term is defined as all the thoughts and feelings we have in response to the question, “Who am I?”

a. Self-concept
b. Ideal self
c. Self-esteem
d. Real self
e. Self-efficacy

6. Which psychologist is incorrectly matched with the theory?

a. Freud—Psychoanalytic
b. Rogers—Humanistic
c. Maslow—Trait
d. Bandura—Social-cognitive
e. Cattell—Trait

7. Which term describes questionnaires that cover a wide range of feelings and behaviors and are designed to assess several traits?

a. Factor analysis studies
b. Peer reports
c. Achievement tests
d. Cognition tests
e. Personality inventories

8. Someone from a collectivist culture is more likely to do what?

a. Develop a strong sense of self
b. Give priority to group goals
c. Form casual, often temporary relationships
d. Achieve personal goals
e. Focus on how they are different from the group

9. Critics of humanistic psychology have suggested that this theory fails to appreciate the reality of our human capacity for which of the following?

a. Empathy
b. Love
c. Evil

d. Empathy
e. Self-acceptance

0. Factor analysis is the test-development strategy that

a. develops ambiguous pictures.
b. looks to find items on a test that differentiate between groups and chooses those items for the test.
c. analyzes a person’s reciprocal determinism in a given situation.
d. analyzes the most common defense mechanisms.
e. determines how people feel about themselves in the present moment.

1. In Brad Bushman and Roy Baumeister’s research, how did people with unrealistically high self-esteem react when they were criticized?

a. They became exceptionally aggressive.
b. Many were more receptive to the criticism.
c. Some became easily depressed.
d. Most worked harder to do better the next time.
e. They quit the task without completing it.

2. Carl Rogers felt that we are our best selves when we feel accepted for who we are. What did he call this accepting attitude?

a. A peak experience
b. Unconditional positive regard
c. Self-transcendence
d. Humanistic psychology
e. Our self-concept

3. Children’s TV-viewing habits (past behavior) influence their viewing preferences (internal personal factor), which influence how television (environmental factor) affects their current behavior. What is this an example of?

a. Spotlight effect
b. Learned helplessness
c. Reciprocal determinism

d. The Big Five traits
e. Implicit learning

4. Which of the following theories offers a special focus on the potential for healthy personal growth?

a. Neo-Freudian
b. Psychodynamic
c. Humanistic
d. Behavioral
e. Functionalist

5. Elaine's friends know that she should never be trusted with a secret, as she will tell everyone almost immediately. Elaine, however, complains that her friends can't be trusted. Elaine is making use of the defense mechanism of

a. rationalization.
b. regression.
c. displacement.
d. sublimation.
e. projection.

6. Thom is 6. How would Sigmund Freud explain his resolving of his Oedipus complex?

a. He will develop a strong interest in what his father is interested in.
b. He will continue to resent his father, but also come to resent his mother.
c. He will displace his anger onto his older sister.
d. He will develop a strong superego.
e. He will develop a weak id.

7. A psychoanalytic psychologist might use the TAT and the Rorschach test in order to

a. get a glimpse of a person's ideal self.
b. determine if a person is an introvert.

c. determine if a person is conscientious.
d. gain insight about a person’s unconscious mind.
e. gain insight about where a person falls in Maslow’s hierarchy of needs.

8. The most widely used scientifically validated personality test is the

a. TAT.
b. Rorschach.
c. MMPI-2.
d. Myers-Briggs.
e. UPR self-inventory.

9. Paola and Juliana went to a baseball game and were shown on the centerfield screen. Juliana was embarrassed, because she had mustard on her face from her hot dog. In reality, no one in the crowd noticed the mustard. Juliana was overestimating how much attention people were paying to her due to the

a. self-efficacy effect.
b. self-serving bias.
c. self-transcendent effect.
d. terror-management theory.
e. spotlight effect.

Free-Response Questions

1. Briefly explain how each of the following theorists would view personality measurement, using appropriate psychological terminology.

- Psychodynamic theorists
- Humanistic theorists
- Trait theorists

Rubric for Free-Response Question 1

1 point: Psychodynamic theorists view the goal of personality measurement as revealing the unconscious conflicts and impulses that drive and create our personality. Projective tests (such as the TAT or Rorschach test) supposedly allow individuals to “project” their unconscious desires and impulses onto the test so that they are revealed to the therapist and client. Page 584

1 point: Humanistic theorists are skeptical about attempts to measure personality. They view personality tests and other attempts at measuring and quantifying personality as potentially depersonalizing, reducing the complexity of a person to one of a few generalized categories. Page 593

1 point: Trait theorists attempt to measure personality through personality inventories, such as the MMPI. They are most interested in knowing where a person fits on each of the Big Five personality factors. Pages 598–601

2. Alejandro has joined an online dating service in an attempt to meet some new people. He met a woman named Sakura through the website and agreed to go on a date with her because they have many things in common.
Explain how the following concepts could relate to Alejandro and Sakura’s date:

- Self-concept
- Self-efficacy
- Extraversion/introversion
- Spotlight effect

(4 points)

3. Maylin has a negative attitude and is disrespectful of her peers. She is unhappy at work and has not been performing at her job as well as in the past. Unfortunately, Maylin blames her co-workers for mistakes that have been made and feels as if the world is against her.

A. Explain how each of the following psychological concepts might explain Maylin’s *negative* or *unpleasant* behavior.

- Self-serving bias
- Displacement

B. Explain how each of the following psychological concepts might *help* Maylin become more positive in her daily life.

- Self-actualization
- Sublimation
- Unconditional positive regard

(5 points)

UNIT XI Testing and Individual Differences

Hill Street Studios/Getty Images

MODULES

60 Introduction to Intelligence

61 Assessing Intelligence

62 The Dynamics of Intelligence

63 Studying Genetic and Environmental Influences on Intelligence

64 Group differences and the question of bias

Three huge controversies have sparked debate in and beyond psychology. First is the “memory war,” over whether traumatic experiences are repressed and can later be recovered, with therapeutic benefit. Second is the “gender war,” over the extent to which nature and nurture shape our behaviors as men and women. In this unit, we meet the third great controversy, the “intelligence war”: Does each of us have an inborn general mental capacity (intelligence)? Can we quantify this capacity as a meaningful number? And can we measure intelligence without bias?

School boards, courts, and scientists debate the use and fairness of tests that assess people’s mental abilities and assign them a score. Is intelligence testing a constructive way to guide people toward suitable opportunities? Or is it a potent, discriminatory weapon camouflaged as science? First, some basic questions:

- What is intelligence?
- How can we best assess intelligence?
- How does intelligence change over time and vary among individuals?
- How do heredity and experience together weave the intelligence fabric?
- What intelligence test score similarities and differences exist among groups, and what accounts for those differences? Should we use such differences to track the abilities of students? To admit them to colleges or universities? To hire them?

This unit offers answers, by identifying a variety of mental gifts and concluding that the recipe for high achievement blends talent and grit.

Unit XI Overview Video

Module **60 Introduction to Intelligence**

LEARNING TARGETS

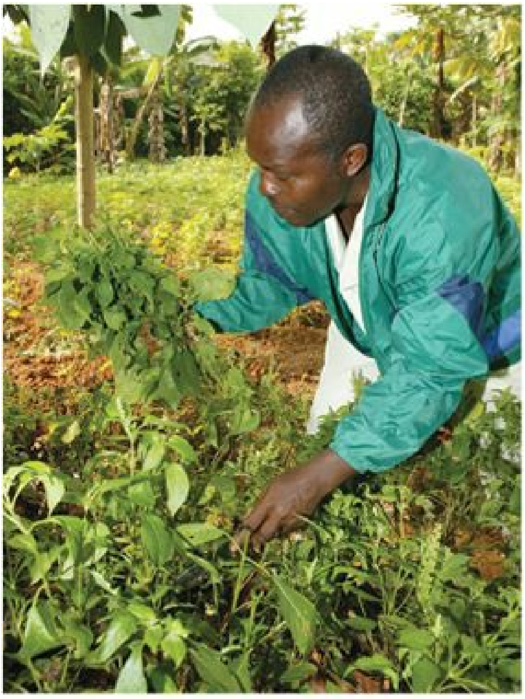
- 60-1 Discuss how psychologists define *intelligence*, and present the arguments for *g*.
- 60-2 Compare Gardner’s and Sternberg’s theories of multiple intelligences, and discuss the criticisms they have faced.
- 60-3 Describe the four components of emotional intelligence.

60-1 How do psychologists define *intelligence*, and what are the arguments for *g*?

In many studies, *intelligence* has been defined as whatever *intelligence tests* measure, which has tended to be school smarts. But intelligence is not a quality like height or weight, which have the same meaning to everyone worldwide. People assign this term to the qualities that enable success in their own time and culture (Sternberg & Kaufman, 1998). In Cameroon’s equatorial forest, *intelligence* may reflect understanding the medicinal qualities of local plants. In a North American high school, it may reflect mastering difficult concepts in calculus or chemistry. In both places, **intelligence** is the ability to learn from experience, solve problems, and use knowledge to adapt to new situations.

intelligence

the ability to learn from experience, solve problems, and use knowledge to adapt to new situations.



imageBROKER/Alamy

Hands-on healing The socially constructed concept of intelligence varies from culture to culture. This natural healer in Cameroon displays intelligence in his knowledge about medicinal plants and his understanding of the needs of the people he is helping.

You probably know some people with talents in science, others who excel in the humanities, and still others gifted in athletics, art, music, or dance. You may also know a talented artist who is stumped by the simplest math problem, or a brilliant math student who struggles when discussing literature. Are all these people intelligent? Could you rate their intelligence on a single scale? Or would you need several different scales?

AP® EXAM TIP

Your authors identified three “huge controversies” in the unit opener. All three are covered extensively in this book; be sure you can explain each of them.

Is Intelligence One General Ability?

Charles Spearman (1863–1945) believed we have one **general intelligence** (often shortened to *g*) that is at the heart of all our intelligent behavior, from navigating the sea to excelling in school. He granted that people often have special, outstanding abilities. But he noted that those who score high in one area, such as verbal intelligence, typically score higher than average in other areas, such as spatial or reasoning ability. Spearman's belief stemmed in part from his work with **factor analysis**, a statistical procedure that identifies clusters of related items.

general intelligence (*g*)

according to Spearman and others, underlies all mental abilities and is therefore measured by every task on an intelligence test.

factor analysis

a statistical procedure that identifies clusters of related items (called factors) on a test; used to identify different dimensions of performance that underlie a person's total score.

This idea of a general mental capacity expressed by a single intelligence score was controversial in Spearman's day, and so it remains. One of Spearman's early opponents was L. L. Thurstone (1887–1955). Thurstone gave 56 different tests to people and mathematically identified seven clusters of *primary mental abilities* (word fluency, verbal comprehension, spatial ability, perceptual speed, numerical ability, inductive reasoning, and memory). Thurstone did not rank people on a single scale of general aptitude. But when other investigators studied these profiles, they detected a persistent tendency: Those who excelled in one of the seven clusters generally scored well on the others. So, the investigators concluded, there was still some evidence of a *g* factor.

> “*g is one of the most reliable and valid measures in the behavioral domain . . . and it predicts important social outcomes such as educational and occupational levels far better than any other trait.*”
>
> *Behavior geneticist Robert Plomin (1999)*

We might, then, liken mental abilities to physical abilities: Athleticism is not one thing, but many. The ability to run fast is distinct from the eye-hand coordination required to throw a ball on target. Yet there remains some tendency for good things to come packaged together—for running speed and throwing accuracy to correlate. So, too, with intelligence. Several distinct abilities tend to cluster together and to correlate enough to define a general intelligence factor. Distinct brain networks enable distinct abilities, with *g* explained by their coordinated activity (Cole et al., 2015; Hampshire et al., 2012). The result is a chorus of actions orchestrated through the best possible distribution of mental resources (Carroll & Bright, 2016; Lee et al., 2015).

Theories of Multiple Intelligences

60-2 How do Gardner’s and Sternberg’s theories of multiple intelligences differ, and what criticisms have they faced?

Other psychologists, particularly since the mid-1980s, have sought to extend the definition of *intelligence* beyond the idea of academic smarts.

Gardner’s Multiple Intelligences

Howard Gardner has identified eight *relatively independent intelligences*, including the verbal and mathematical aptitudes assessed by standardized tests (**Figure 60.1**). Thus, the computer programmer, the poet, the street-smart adolescent, and the basketball team’s play-making point guard exhibit different kinds of intelligence (Gardner, 1998). Gardner (1999a) has also proposed a ninth possible intelligence—*existential intelligence*—the ability “to ponder large questions about life, death, existence.”

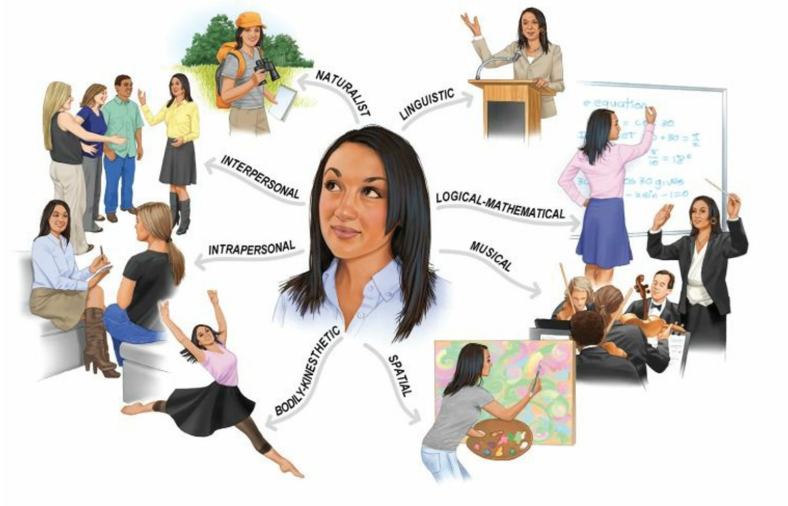


Figure 60.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 60.1 Gardner’s eight intelligences

Gardner has also proposed existential intelligence (the ability to ponder deep questions about life) as a ninth possible intelligence.

Gardner (1983, 2006; 2011; Davis et al., 2011) views these intelligence domains as multiple abilities that come in different packages. Brain damage, for example, may destroy one ability but leave others intact. And consider people with **savant syndrome**, who have an island of brilliance but often score low on intelligence tests and may have limited or no language ability (Treffert, 2010). Some can compute complicated calculations almost instantly, or identify the day of the week of any given historical date, or render incredible works of art or music (Miller, 1999).

savant syndrome
a condition in which a person otherwise limited in mental ability has an exceptional specific skill, such as in computation or drawing.

Then Chih Wey/Xinhua News Agency/Newscom

Islands of genius: Savant syndrome After a brief helicopter ride over Singapore followed by five days of drawing, British savant artist Stephen Wiltshire accurately reproduced an aerial view of the city from memory.

About 4 in 5 people with savant syndrome are male, and many also have *autism spectrum disorder* (*ASD;* see Module 47). The late memory whiz Kim Peek (who did not have ASD) inspired the movie *Rain Man.* It took him 8 to 10 seconds to read and remember a page. During his lifetime, he memorized 9000 books, including Shakespeare’s works and the Bible. He could provide GPS-like travel directions within any major U.S. city. Yet he could not button his clothes, and he had little capacity for abstract concepts. Asked by his father at a restaurant to lower his voice, he slid down in his chair to lower his voice box. Asked for Lincoln’s Gettysburg Address, he responded, “227 North West Front Street. But he only stayed there one night—he gave the speech the next day” (Treffert & Christensen, 2005).

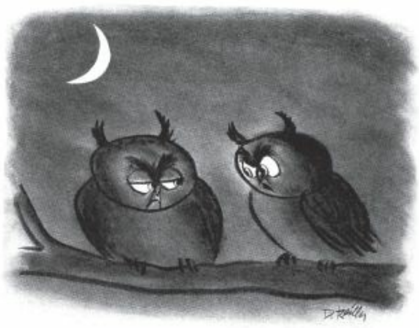
Sternberg’s Three Intelligences

Robert Sternberg (1985, 2011) agrees with Gardner that there is more to success than traditional intelligence and that we have multiple intelligences. But Sternberg’s *triarchic theory* proposes three, not eight or nine, intelligences:

- ***Analytical (academic problem-solving) intelligence*** is assessed by intelligence tests, which present well-defined problems having a single right answer. Such tests predict school grades reasonably well and vocational success more modestly.
- ***Creative intelligence*** is demonstrated in innovative smarts: the ability to adapt to new situations and generate novel ideas.
- ***Practical intelligence*** is required for everyday tasks that may be poorly defined and may have multiple solutions.

> “*You have to be careful, if you’re good at something, to make sure you don’t think you’re good at other things that you aren’t necessarily so good at. . . . Because I’ve been very successful at [software development] people come in and expect that I have wisdom about topics that I don’t.*”
>
> *Microsoft co-founder Bill Gates (1998)*

With support from the U.S. College Board (which administers the Advanced Placement Program® as well as the widely used SAT Reasoning Test to U.S. college and university applicants), Sternberg (2015) and his collaborators have developed new measures of creativity (such as thinking up a caption for an untitled cartoon) and practical thinking (such as figuring out how to move a large bed up a winding staircase). Compared to older measures, these more comprehensive assessments improve prediction of American students' first-year college grades.



Donald Reilly The New Yorker Collection/The Cartoon Bank

"You're wise, but you lack tree smarts."

Gardner and Sternberg differ in some areas, but they agree on two important points: Multiple abilities can contribute to life success, and differing varieties of giftedness bring both spice to life and challenges for education. Trained to appreciate such variety, many teachers have applied multiple intelligence theories in their classrooms.

David R. Frazier Photolibrary, Inc./Alamy

Street smarts This child selling candy on the streets of Manaus, Brazil, is developing practical intelligence at a very young age.

Criticisms of Multiple Intelligence Theories

Wouldn’t it be nice if the world were so fair that a weakness in one area would be compensated by genius in another? Alas, say critics, the world is not fair (Ferguson, 2009; Scarr, 1989). Research using factor analysis confirms that there *is* a general intelligence factor: *g* matters (Johnson et al., 2008). It predicts performance on various complex tasks and in various jobs (Gottfredson, 2002a,b, 2003a,b; see also **Figure 60.2**). And extremely high cognitive ability scores predict exceptional achievements, such as doctoral degrees and publications (Kuncel & Hezlett, 2010).

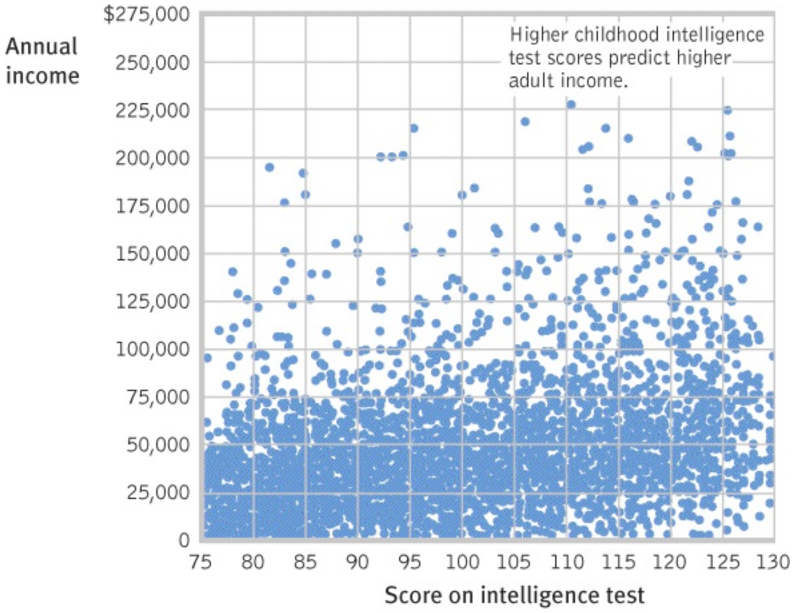


Figure 60.2
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 60.2 Smart and rich?

Jay Zagorsky (2007) tracked 7403 participants in the U.S. National Longitudinal Survey of Youth across 25 years. As shown in this illustrative scatterplot, their intelligence scores correlated +.30, a moderate positive correlation, with their later income.

Courtesy of Cameras on Wheels

Spatial intelligence genius In 1998, World Checkers Champion Ron “Suki” King of Barbados set a new record by simultaneously playing 385 players in 3 hours and 44 minutes. Thus, while his opponents often had hours to plot their game moves, King could only devote about 35 seconds to each game. Yet he still managed to win all 385 games!

Even so, “success” is not a one-ingredient recipe. High intelligence may help you get into a good college and ultimately a desired profession, but it won’t make you successful once there. Success is a combination of talent and **grit:** Those who become highly successful tend also to be conscientious, well-connected, and doggedly energetic. K. Anders Ericsson and others report a *10-year rule:* A common ingredient of expert performance in chess, dance, sports, computer programming, music, and medicine is “about 10 years of intense, daily practice” (Ericsson, 2007; Ericsson & Pool, 2016; Simon & Chase, 1973). Becoming a professional musician or an elite athlete requires, first, native ability (Macnamara et al., 2014, 2016). But it also requires years of practice—about 11,000 hours on average, and a *minimum* of 3000 hours (Campitelli & Gobet, 2011). The recipe for success is a gift of nature plus a whole lot of nurture.

grit

in psychology, grit is passion and perseverance in the pursuit of long-term goals.

Emotional Intelligence

60-3 What are the four components of emotional intelligence?

Some psychologists have further explored our *social intelligence*—the know-how involved in understanding social situations and managing ourselves successfully (Cantor & Kihlstrom, 1987). Psychologist Edward Thorndike first proposed the concept in 1920, noting that "the best mechanic in a factory may fail as a foreman for lack of social intelligence" (Goleman, 2006, p. 83).

A critical part of social intelligence, **emotional intelligence**, consists of four abilities (Mayer et al., 2002, 2016):

- *Perceiving* emotions (recognizing them in faces, music, and stories, and identifying one's own emotions)
- *Understanding* emotions (predicting them and how they may change and blend)
- *Managing* emotions (knowing how to express them in varied situations, and how to manage others' emotions)
- *Using* emotions to facilitate adaptive or creative thinking

emotional intelligence

the ability to perceive, understand, manage, and use emotions.

TRY THIS

For more on how self-disciplined grit feeds achievement, see Module 40.

Emotionally intelligent people are both socially aware and self-aware. They avoid being hijacked by overwhelming depression, anxiety, or anger. They can read others' emotional cues and know what to say to soothe a grieving friend, encourage a workmate, and manage a conflict. They can delay gratification in pursuit of long-range rewards. Thus, emotionally intelligent people more often succeed in relationship, career, and parenting situations than do academically smarter but less emotionally intelligent people (Cherniss, 2010a,b; Czarna et al., 2016; Miao et al., 2016). They also tend to be happy and healthy (Sánchez-Álvarez et al., 2016; Schutte et al., 2007, 2016). Aware of these benefits, school-based programs have sought to increase teachers' and students' emotional intelligence (Nathanson et al., 2016).

FYI

The procrastinator's motto: "Hard work pays off later; laziness pays off now."

AP® EXAM TIP

Familiarize yourself with Table 60.1. Be able to compare and contrast the contributions of the intelligence theorists (e.g., Spearman, Gardner, Sternberg).

Some scholars, however, are concerned that emotional intelligence stretches the intelligence concept too far (Visser et al., 2006). Howard Gardner (1999b) includes interpersonal and intrapersonal intelligences as two of his multiple intelligences. But he notes that we should respect emotional sensitivity, creativity, and motivation as important but different. Stretch *intelligence* to include everything we prize and the word will lose its meaning.

* * *

For a summary of these theories of intelligence, see **Table 60.1**.

TABLE 60.1 Comparing Theories of Intelligence

Theory	**Summary**	**Strengths**	**Other Considerations**

Spearman's general intelligence (g)	A basic intelligence predicts our abilities in varied academic areas.	Different abilities, such as verbal and spatial, do have some tendency to correlate.	Human abilities are too diverse to be encapsulated by a single general intelligence factor.
Thurstone's primary mental abilities	Our intelligence may be broken down into seven distinct factors.	A single *g* score is not as informative as scores for seven primary mental abilities.	Even Thurstone's seven mental abilities show a tendency to cluster, suggesting an underlying *g* factor.
Gardner's multiple intelligences	Our abilities are best classified into eight or nine independent intelligences, which include a broad range of skills beyond traditional school smarts.	Intelligence is more than just verbal and mathematical skills. Other abilities are equally important to our human adaptability.	Should all our abilities be considered *intelligences?* Shouldn't some be called less vital *talents?*
Sternberg's triarchic theory	Our intelligence is best classified into three areas that predict real-world success: analytical, creative, and practical.	These three domains can be reliably measured.	These three domains may be less independent than Sternberg thought and may actually share an underlying *g* factor.
Emotional intelligence	Social intelligence is an important indicator of life success. Emotional intelligence is a key aspect, consisting of perceiving, understanding, managing, and using	These four components predict social success and emotional well-being.	Does this stretch the concept of intelligence too far?

	emotions.		

Check Your Understanding

Ask Yourself

- The modern concept of multiple intelligences (as proposed by Gardner and Sternberg) assumes that the analytical school smarts measured by traditional intelligence tests are important abilities but that other abilities are also important. Different people have different gifts. What are yours?

Test Yourself

- How does the existence of savant syndrome support Gardner’s theory of multiple intelligences?
- Joseph, a Harvard Law School student, has a straight-A average, writes for the *Harvard Law Review*, and will clerk for a Supreme Court justice next year. His grandmother, Judith, is very proud of him, saying he is far more intelligent than she ever was. But Joseph is also very proud of Judith: As a young woman, she was imprisoned by the Nazis. When the war ended, she walked out of Germany, contacted an agency helping refugees, and began a new life in the United States as an assistant chef in her cousin’s restaurant. According to the definition of intelligence in this unit, is Joseph the only intelligent person in this story? Why or why not?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 60 REVIEW

60-1 How do psychologists define *intelligence*, and what are the arguments for *g*?

- *Intelligence* is a mental quality consisting of the ability to learn from experience, solve problems, and use knowledge to adapt to new situations.
- Charles Spearman proposed that we have one *general intelligence (g)*. Through his work with *factor analysis*, a statistical procedure that identifies clusters of related mental abilities, he noted that those who score high in one area typically score higher than average in other areas.
- L. L. Thurstone disagreed and identified seven different clusters of mental abilities. Yet a tendency remained for high scorers in one cluster to score high in other clusters, providing further evidence of a *g* factor.

60-2 How do Gardner's and Sternberg's theories of multiple intelligences differ, and what criticisms have they faced?

- Howard Gardner proposed eight independent intelligences (linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, intrapersonal, interpersonal, and naturalist), as well as a possible ninth (existential intelligence). The different intelligences of people with *savant syndrome*, autism spectrum disorder (ASD), and certain kinds of brain damage seem to support his view.
- Robert Sternberg's triarchic theory proposes three intelligence areas that predict real-world skills: analytical (academic problem solving), creative, and practical.
- Critics note that while high intelligence may open doors, success in school, at work, or at a sport or hobby is a combination of talent and *grit*.

60-3 What are the four components of emotional intelligence?

- *Emotional intelligence,* which is an aspect of social intelligence, is the ability to perceive, understand, manage, and use emotions.
- Emotionally intelligent people tend to be happy, healthy, and more successful in their personal and professional lives.
- Some critics question whether calling these abilities “intelligence” stretches that concept too far.

Multiple-Choice Questions

1. An intelligence test that asks a person how many uses they can think of for a golf ball is most likely testing a person’s _____ intelligence.

a. linguistic
b. practical
c. creative
d. spatial
e. analytical

2. According to Charles Spearman and others, _____ underlies specific mental abilities and is measured by every task on an intelligence test.

a. savant syndrome
b. general intelligence (*g*)
c. factor analysis
d. intelligence
e. emotional intelligence

3. Victor is blind, unable to speak, and understands very few words. He is, however, able to hear a piece of music once and play it back flawlessly on the piano. Victor’s abilities best represent someone with

a. analytical intelligence.
b. a high *g* factor.
c. savant syndrome.
d. emotional intelligence.

   e. intrapersonal intelligence.

4. Which of the following is not a component of emotional intelligence?

   a. Understanding emotions
   b. Perceiving emotions
   c. Using emotions
   d. Managing emotions
   e. Inventing emotions

Practice FRQs

1. Give a summary, a strength, and a weakness of Charles Spearman's idea of general intelligence.

Answer

1 point: Spearman suggested we have a general intelligence—an underlying mental ability—that predicts performance for all intelligent behavior. Page 626

1 point: Strength: Different abilities, such as verbal and spatial, do tend to correlate. Page 626

1 point: Weakness: Human abilities are too diverse to be explained by a single general intelligence factor. Page 627

2. Mark and Bill are planning to open a piano-moving business and are hoping for great success. Explain how each element of Sternberg's intelligence theory could help them be successful in their business.

(3 points)

Module **61 Assessing Intelligence**

LEARNING TARGETS

- 61-1 Describe the characteristics of an *intelligence test*, and distinguish between achievement and aptitude tests.
- 61-2 Discuss when and why intelligence tests were created, and explain how today's tests differ from early intelligence tests.
- 61-3 Describe the *normal curve*, and explain *standardization*, *reliability*, and *validity*.

61-1 What is an *intelligence test*, and how do achievement and aptitude tests differ?

An **intelligence test** assesses people's mental aptitudes and compares them with those of others, using numerical scores. How do we design such tests, and what makes them credible?

intelligence test

a method for assessing an individual's mental aptitudes and comparing them with those of others, using numerical scores.

By this point in your life, you've faced dozens of ability tests: school tests of basic reading and math skills, class quizzes and tests, intelligence tests, or maybe a driver's license exam. Psychologists classify such tests as either **achievement tests**, intended to *reflect* what you have learned, or **aptitude tests**, intended to *predict* your ability to learn a new skill. Exams covering what you have learned in this course (like the AP® exam) are achievement tests. A college entrance exam, which seeks to predict your ability to do college work, is an aptitude test—a “thinly disguised intelligence test,” says Howard Gardner (1999b). Indeed, total scores on the U.S. SAT have correlated +0.82 with general intelligence test scores in a national sample of 14- to 21-year-olds (Frey & Detterman, 2004; **Figure 61.1**).

achievement test

a test designed to assess what a person has learned.

aptitude test

a test designed to predict a person’s future performance; *aptitude* is the capacity to learn.

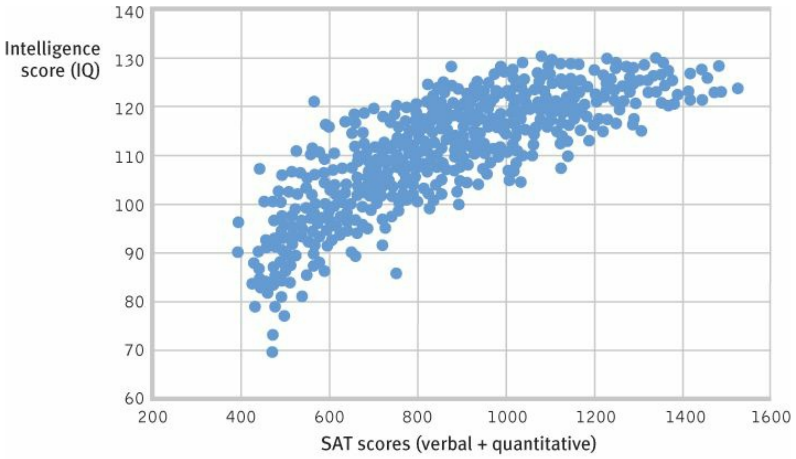


Figure 61.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Frey and Detterman, 2004.

Figure 61.1 Close cousins: Aptitude and intelligence test scores

A scatterplot shows the close correlation that has existed between intelligence test scores and SAT scores.

Early and Modern Tests of Mental Abilities

61-2 When and why were intelligence tests created, and how do today’s tests differ from early intelligence tests?

Some societies emphasize the collective welfare of the family, community, and society. Other societies focus on promoting individual opportunity. Plato, a pioneer of the individualist tradition, wrote more than 2000 years ago in *The Republic* that “no two persons are born exactly alike; but each differs from the other in natural endowments, one being suited for one occupation and the other for another.” As heirs to Plato’s individualism, people in Western societies have pondered how and why individuals differ in mental ability.

AP® EXAM TIP

Become familiar with the key contributors in intelligence testing and be able to identify how they differ (e.g., Galton, Binet, Terman).

Francis Galton: Presuming Hereditary Genius

Western attempts to assess such differences began in earnest with English scientist Francis Galton (1822–1911), who was fascinated with measuring human traits. When his cousin Charles Darwin proposed that nature selects successful traits through the survival of the fittest, Galton wondered if it might be possible to measure “natural ability” and to encourage those of high ability to mate with one another. At the 1884 London Health Exhibition, more than 10,000 visitors received his assessment of their “intellectual strengths” based on such things as reaction time, sensory acuity, muscular power, and body proportions. But alas, on these measures, well-regarded adults and students did not outscore others. Nor did the measures correlate with each other.

Although Galton’s quest for a simple intelligence measure failed, he gave us some statistical techniques that we still use (as well as the phrase *nature and nurture*). And his persistent belief in the inheritance of genius—reflected in his book, *Hereditary Genius*—illustrates an important lesson from both the history of intelligence research and the history of science: Although science itself strives for objectivity, individual scientists are affected by their own assumptions and attitudes.

Alfred Binet: Predicting School Achievement

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Alfred Binet (1857–1911) "Some recent philosophers have given their moral approval to the deplorable verdict that an individual's intelligence is a fixed quantity, one which cannot be augmented. We must protest and act against this brutal pessimism" (Binet, 1909, p. 141).

Modern intelligence testing traces its birth to early twentieth-century France, where a new law required all children to attend school. French officials knew that some children, including many newcomers to Paris, would struggle and need special classes. But how could the schools make fair judgments about children's learning potential? Teachers might assess children who had little prior education as slow learners. Or they might sort children into classes by their social backgrounds. To minimize such bias, France's minister of public education gave psychologist Alfred Binet the task of designing fair tests.

Binet and his student, Théodore Simon, began by assuming that all children follow the same course of intellectual development but that some develop more rapidly (Nicolas & Levine, 2012). A “dull” child should score much like a typical younger child, and a “bright” child like a typical older child. Thus, their goal became measuring each child’s **mental age**, the level of performance typically associated with a certain chronological age. The average 9-year-old, then, has a mental age of 9. Children with below-average mental ages, such as 9-year-olds who perform at the level of typical 7-year-olds, would struggle with age-appropriate schoolwork.

mental age

a measure of intelligence test performance devised by Binet; the level of performance typically associated with children of a certain chronological age. Thus, a child who does as well as an average 8-year-old is said to have a mental age of 8.

To measure mental age, Binet and Simon theorized that mental aptitude, like athletic aptitude, is a general capacity that shows up in various ways. They tested a variety of reasoning and problem-solving questions on Binet’s two daughters, and then on “bright” and “backward” Parisian schoolchildren. Items answered correctly could then predict how well other French children would handle their schoolwork.

Binet and Simon made no assumptions concerning *why* a particular child was slow, average, or precocious. Binet personally leaned toward an environmental explanation. To raise the capacities of low-scoring children, he recommended “mental orthopedics” that would help develop their attention span and self-discipline. He believed his intelligence test did not measure inborn intelligence as a scale measures weight. Rather, it had a single practical purpose: to identify French schoolchildren needing special attention. Binet hoped his test would be used to improve children’s education, but he also feared it would be used to label children and limit their opportunities (Gould, 1981).

Lewis Terman: Measuring Innate Intelligence

Binet’s fears were realized soon after his death in 1911, when others adapted his tests for use as a numerical measure of inherited intelligence. Stanford University professor Lewis Terman (1877–1956) tried the Paris-developed questions and age norms with California schoolchildren. But the French norms didn’t work with California kids. Adapting some of Binet’s original items, adding others, and establishing new age norms, Terman extended the upper end of the test’s range from teenagers to “superior adults.” He also gave his revision the name today’s version retains—the **Stanford-Binet**. For Terman, intelligence tests revealed the intelligence with which a person was born.

Stanford-Binet

the widely used American revision (by Terman at Stanford University) of Binet’s original intelligence test.

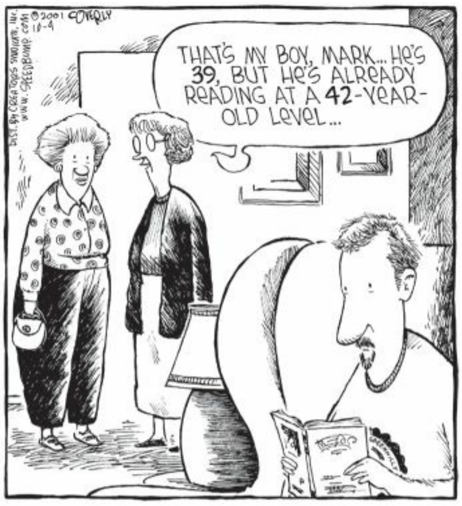
From such tests, German psychologist William Stern derived the famous term **intelligence quotient**, or **IQ**. The IQ was simply a person’s mental age divided by chronological age and multiplied by 100 to get rid of the decimal point. Thus, an average child, whose mental and chronological ages are the same, has an IQ of 100. But an 8-year-old who answers questions as would a typical 10-year-old has an IQ of 125:

$$\text{IQ}=\text{mental age of 10}\text{chronological age of 8}\times 100=125$$

intelligence quotient (IQ)

defined originally as the ratio of mental age (*ma*) to chronological age (*ca*) multiplied by 100 (thus, IQ = *ma/ca* × 100). On contemporary intelligence tests, the average performance for a given age is assigned a score of 100.

The original IQ formula worked fairly well for children but not for adults. (Should a 40-year-old who does as well on the test as an average 20-year-old be assigned an IQ of only 50?) Most current intelligence tests, including the Stanford-Binet, no longer compute an IQ in this manner (though the term *IQ* still lingers as a shorthand expression for “intelligence test score”). Instead, they assign a score that represents a test-taker’s performance *relative to the average performance* (which is arbitrarily set at 100) of others the same age. Intelligence test scores for most people—about 68 percent—fall between 85 and 115.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DIST. BY CREATORS SYNDICATE, INC.
WWW.SPEEDBUMP.COM
THAT'S MY BOY, MARK... HE'S 39, BUT HE'S ALREADY READING AT A 42-YEAR-OLD LEVEL...

© Dave Coverly/speedbump.com

Mrs. Randolph takes mother’s pride too far.

Terman (1916, p. 4) promoted the widespread use of intelligence testing to “take account of the inequalities of children in original endowment” by assessing their “vocational fitness.” He sympathized with Francis Galton’s *eugenics*—the much-criticized nineteenth-century movement that proposed measuring human traits and using the results to restrict reproduction among those deemed not smart and fit. Terman envisioned that the use of intelligence tests would “ultimately result in curtailing the reproduction of feeble-mindedness and in the elimination of an enormous amount of crime, pauperism, and industrial inefficiency” (p. 7).

With Terman’s help, the U.S. government developed new tests to evaluate both newly arriving immigrants and World War I army recruits—the world’s first mass administration of an intelligence test. To some psychologists, the results indicated the inferiority of people not sharing their Anglo-Saxon heritage.

> “*The IQ test was invented to predict academic performance, nothing else. If we wanted something that would predict life success, we’d have to invent another test completely.*”
>
> *Social psychologist Robert Zajonc (1984)*

Binet probably would have been horrified that his test had been adapted and used to draw such conclusions. Indeed, such sweeping judgments became an embarrassment to most of those who championed testing. Even Terman came to appreciate that test scores reflected not only people’s innate mental abilities but also their education, native language, and familiarity with the culture assumed by the test. Abuses of the early intelligence tests, such as in immigrant screening, serve to remind us that science can be value-laden. Behind a screen of scientific objectivity, ideology sometimes lurks.

✓ Check Your Understanding

Ask Yourself

- What achievement or aptitude tests have you taken? In your opinion, how well did these tests predict what you’d learned or what you were capable of learning?

Test Yourself

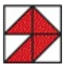
- What did Binet hope to achieve by establishing a child’s mental age?
- What is the IQ of a 4-year-old with a mental age of 5?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

David Wechsler: Testing Separate Strengths

Psychologist David Wechsler created what is now the most widely used individual intelligence test, the **Wechsler Adult Intelligence Scale (WAIS)**, together with a version for school-age children (the *Wechsler Intelligence Scale for Children [WISC]*) and another for preschool children

(Evers et al., 2012). The latest (2008) edition of the WAIS consists of 15 subtests, including these:

- *Similarities*—reasoning the commonality of two objects or concepts ("In what way are wool and cotton alike?")
- *Vocabulary*—naming pictured objects, or defining words ("What is a guitar?")
- *Block Design*—visual abstract processing ("Using the four blocks, make one just like this.") 
- *Letter-Number Sequencing*—on hearing a series of numbers and letters, repeating the numbers in ascending order, and then the letters in alphabetical order ("R-2-C-1-M-3")

Wechsler Adult Intelligence Scale (WAIS)
the WAIS and its companion versions for children are the most widely used intelligence tests; they contain verbal and performance (nonverbal) subtests.

The WAIS yields not only an overall intelligence score, as does the Stanford-Binet, but also individual scores for verbal comprehension, perceptual organization, working memory, and processing speed. Striking differences among these individual scores can provide clues to cognitive strengths or weaknesses. For example, a low verbal comprehension score combined with high scores on other subtests could indicate a reading or language disability. Other comparisons can help a psychologist or psychiatrist establish a rehabilitation plan for a stroke patient. In such ways, these tests help realize Binet's aim: to identify opportunities for improvement and strengths that teachers and others can build upon. Such uses are possible, of course, only when we can trust the test results.

Richard T. Nowitz/Getty Images

Matching patterns Block design puzzles test visual abstract processing ability. Wechsler’s individually administered intelligence test comes in forms suited for adults and children.

Principles of Test Construction

61-3 What is a *normal curve*, and what does it mean to say that a test has been *standardized* and is *reliable* and *valid*?

To be widely accepted, a psychological test must meet three criteria: It must be *standardized*, *reliable*, and *valid*. The Stanford-Binet and Wechsler tests meet these requirements.

Standardization

The number of questions you answer correctly on an intelligence test would reveal almost nothing. To know how well you performed, you would need some basis for comparison. That’s why test-makers give new tests to a representative sample of people. The scores from this pretested group become the basis for future comparisons. If you then take the test following the same procedures, your score will be meaningful when compared with others. This process is called **standardization**.

standardization

defining uniform testing procedures and meaningful scores by comparison with the performance of a pretested group.

If we construct a graph of test-takers’ scores, the scores typically form a bell-shaped pattern called the *bell curve*, or **normal curve**. No matter what attributes we measure—height, weight, or mental aptitude—the curve’s highest point is the average score. On an intelligence test, we give this average score a value of 100 (**Figure 61.2**). Moving out from the average toward either extreme, we find fewer and fewer people. For both the Stanford-Binet and Wechsler tests, a person’s score indicates whether that person’s performance fell above or below the average. A performance higher than all but 2.5 percent of all scores earns an intelligence score of 130. A performance lower than 97.5 percent of all scores earns an intelligence score of 70.

normal curve
the bell-shaped curve that describes the distribution of many physical and psychological attributes. Most scores fall near the average, and fewer and fewer scores lie near the extremes.

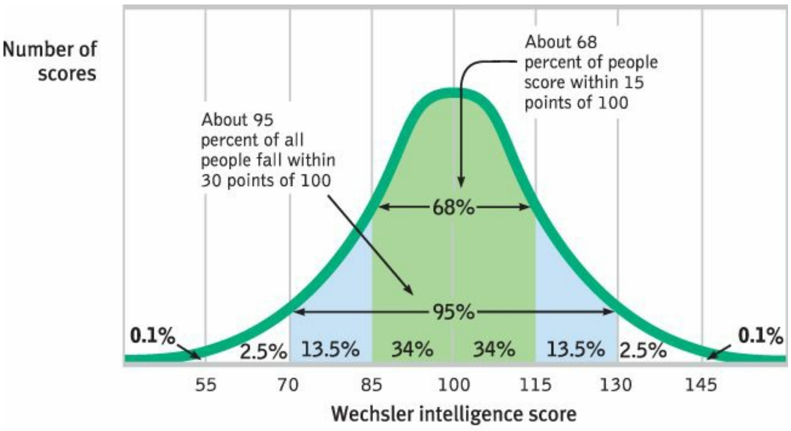


Figure 61.2
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Figure 61.2 The normal curve

Scores on aptitude tests tend to form a normal, or bell-shaped, curve around an average score. For the Wechsler scale, for example, the average score is 100.

To keep the average score near 100, the Stanford-Binet and Wechsler scales are periodically restandardized. If you recently took the WAIS, Fourth Edition, your performance was compared with a standardization sample who took the test during 2007, not to David Wechsler's initial 1930s sample. If you compared the performance of the most recent standardization sample with that of the 1930s sample, do you suppose you would find rising or declining test performance? Amazingly—given that college entrance aptitude scores have sometimes dropped, such as during the 1960s and 1970s—intelligence test performance has improved. This worldwide phenomenon is called the *Flynn effect*, in honor of New Zealand researcher James Flynn (1987, 2012), who first calculated its magnitude. The average person’s intelligence test score in 1920 was—by today’s standard—only a 76. Such rising performance has been observed in 48 countries, from Canada to Cameroon (Wongupparaj et al., 2015). Although there have been some regional reversals, the historic increase is now widely accepted as an important phenomenon (Lynn, 2009; Teasdale & Owen, 2005, 2008).

AP® EXAM TIP

Can you remember why the intelligence test scores in Figure 61.2 are marked off in 15-point intervals? Do the 68 percent and 95 percent areas seem familiar? They should—you’ve seen this graph before. It’s Figure 8.3 from the module on statistical reasoning. Intelligence tests are being used to illustrate that 68 percent of a population will be within one standard deviation of the mean for normally distributed data. Ninety-five percent will be within two standard deviations.

The Flynn effect’s cause has been a psychological mystery. Did it result from greater test sophistication? *No.* Gains appeared before testing was widespread. Perhaps better nutrition? Thanks to improved nutrition, people have gotten taller as well as smarter. But in postwar Britain, notes Flynn (2009), the lower-class children gained the most from improved nutrition, yet the intelligence performance gains were greater among upper-class children. Might the explanation be greater educational opportunities, smaller families, and rising living standards (Pietschnig & Voracek, 2015; Rindermann et al., 2016)? Flynn (2012) attributes the performance increase to our need to develop new mental skills to cope with modern environments. Regardless of what combination of factors explains the rise in intelligence test scores, the phenomenon counters a concern of some who see intelligence as inherited—that the higher twentieth-century birthrates among those with lower scores would shove human intelligence scores downward (Lynn & Harvey, 2008).

Reliability

Knowing where you stand in comparison to a standardization group still won't say much about your intelligence unless the test has **reliability**. A reliable test gives consistent scores, no matter who takes the test or when they take it. To check a test's reliability, researchers test people many times. They may split the test in half (*split-half:* agreement of odd-question scores and even-question scores), test with alternative forms of the test, or retest with the same test (*test-retest*). The higher the *correlation* between the two scores, the higher the test's reliability. The tests we have considered—the Stanford-Binet, the WAIS, and the WISC—are very reliable after early childhood (about +0.9). When retested, people's scores generally match their first score closely.

reliability
the extent to which a test yields consistent results, as assessed by the consistency of scores on two halves of the test, on alternative forms of the test, or on retesting.

Validity

High reliability does not ensure a test's **validity**—the extent to which the test actually measures or predicts what it promises. Imagine using an inaccurate tape measure to measure people's heights. Your results would be very reliable. No matter how many times you measured, people's heights would be the same. But your faulty height results would not be valid.

validity
the extent to which a test measures or predicts what it is supposed to. (See also *content validity* and *predictive validity*.)

Tests that tap the pertinent behavior, or *criterion*, have **content validity**. The road test for a driver's license has content validity because it samples the tasks a driver routinely faces. Course exams have content validity if they assess one’s mastery of course material. But we expect intelligence tests to have **predictive validity**: They should predict the criterion of future performance, and to some extent they do.

content validity

the extent to which a test samples the behavior that is of interest.

predictive validity

the success with which a test predicts the behavior it is designed to predict; it is assessed by computing the correlation between test scores and the criterion behavior. (Also called *criterion-related validity*.)

Are general aptitude tests as predictive as they are reliable? As critics are fond of noting, the answer is *No.* Aptitude test scores do predict school grades (Roth et al., 2015). But the critics are right that the predictive power of aptitude tests peaks in the early school years and weakens later. Academic aptitude test scores are reasonably good predictors of achievement for children ages 6 to 12, where the correlation between intelligence score and school performance is about +0.6 (Jensen, 1980). Intelligence scores correlate even more closely with scores on *achievement tests:* +0.81 in one comparison of 70,000 English children’s intelligence scores at age 11 with their academic achievement in national exams at age 16 (Deary et al., 2007, 2009b). The SAT, used in the United States as a college entrance exam, has been less successful in predicting first-year college grades. (The correlation, less than +0.5, has been, however, a bit higher when adjusting for high scorers electing tougher courses [Berry & Sackett, 2009; Willingham et al., 1990].) By the time we get to the Graduate Record Examination (GRE; an aptitude test similar to the SAT but for those applying to graduate school), the correlation with graduate school performance is an even more modest but still significant +0.4 (Kuncel & Hezlett, 2007).

AP$^{®}$ EXAM TIP

Be prepared for a question about the distinction between *reliability* and *validity*, and how psychologists assess each.

FYI

Ironically, SAT exam (for college entrance) and GRE scores (for graduate school entrance) correlate better with each other than either does with its intended criterion, school achievement. Thus, their reliability far exceeds their predictive validity. If either test was much affected by coaching, luck, or how one feels on the test day (as so many people believe), such reliability would be impossible.

Why does the predictive power of aptitude scores diminish as students move up the educational ladder? Consider a parallel situation: Among all American and Canadian football linemen, body weight correlates with success. A 300-pound player tends to overwhelm a 200-pound opponent. But within the narrow 280- to 320-pound range typically found at the professional level, the correlation between weight and success becomes negligible (**Figure 61.3**). The narrower the *range* of weights, the lower the predictive power of body weight becomes. If an elite university takes only those students who have very high aptitude scores, and then gives them a restricted range of high grades, those scores cannot possibly predict much. This will be true even if the test has excellent predictive validity with a more diverse sample of students. Likewise, modern grade inflation (more students getting high grades) has produced less diverse high school grades. With their diminished range, high school grades now predict college grades no better than have SAT scores (Sackett et al., 2012). So, when we validate a measure using a wide range of scores but then use it with a restricted range of scores, it loses much of its predictive validity.

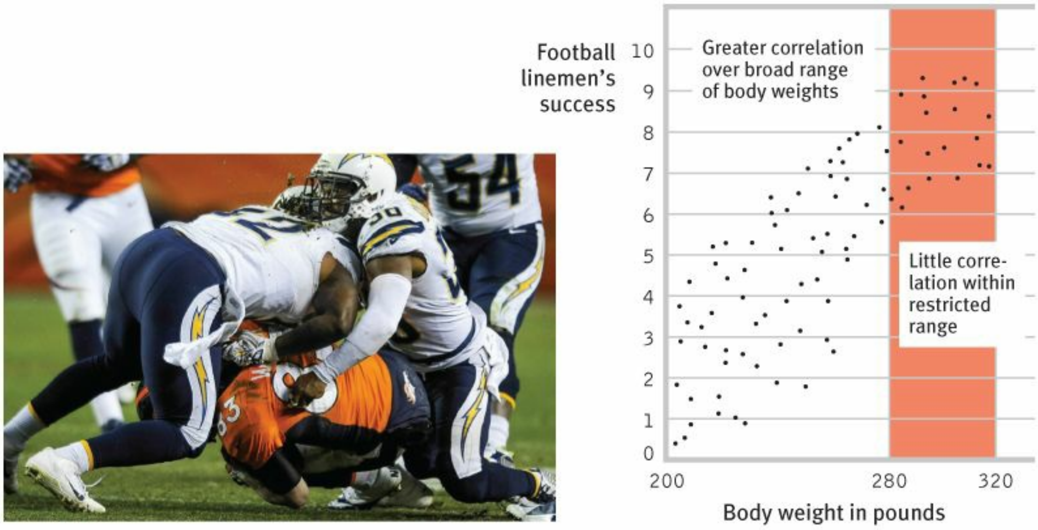


Figure 61.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Photo: Colorado Springs Gazette/Getty Images

Figure 61.3 Diminishing predictive power

Let's imagine a correlation between football linemen's body weight and their success on the field. Note how insignificant the relationship becomes when we narrow the range of weight to 280 to 320 pounds. As the range of data under consideration narrows, its predictive power diminishes.

✓ Check Your Understanding

Ask Yourself

- Are you working to the potential reflected in your standardized test scores? What, other than your aptitude, is affecting your school performance?

Test Yourself

- An employer with a pool of applicants for a single available position is interested in testing each applicant's potential. To determine that, she should use an ________________ (achievement/aptitude) test. That same employer wishing to test the effectiveness of a new, on-the-job training program would be wise to use an ________________ (achievement/aptitude) test.
- What are the three criteria that a psychological test must meet in order to be widely accepted? Explain.
- Correlation coefficients were used in this section. Here's a quick review:

Correlations do not indicate cause-effect, but they do tell us whether two things are associated in some way. A correlation of −1.00 represents perfect _______________ (agreement/disagreement) between two sets of scores: As one score goes up, the other score goes _______________ (up/down). A correlation of _______________ represents no association. The highest correlation, +1.00, represents perfect _______________ (agreement/disagreement): As the first score goes up, the other score goes _______________ (up/down).

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 61 REVIEW

61-1 What is an *intelligence test*, and how do achievement and aptitude tests differ?

- An *intelligence test* assesses people’s mental aptitudes and compares them with those of others, using numerical scores.
- *Achievement tests* are designed to assess what you have learned.
- *Aptitude* tests are designed to predict what you can learn.
- The *WAIS* (*Wechsler Adult Intelligence Scale),* an aptitude test, is the most widely used intelligence test for adults.

61-2 When and why were intelligence tests created, and how do today’s tests differ from early intelligence tests?

- In the late 1800s, Francis Galton, who believed that genius was inherited, attempted but failed to construct a simple intelligence test. His hope had been to identify those with exceptional abilities and encourage them to reproduce.
- In France in 1904, Alfred Binet, who tended toward an environmental explanation of intelligence differences, started the modern intelligence-testing movement by developing questions to measure children’s *mental age* and thus predict progress in the school system. Binet hoped his test would be used to improve children’s education rather than to limit their opportunities.
- During the early twentieth century, Lewis Terman of Stanford University revised Binet’s work for use in the United States.
  - Terman believed intelligence is inherited, and he thought his *Stanford-Binet* could help guide people toward appropriate opportunities.
  - During this period, intelligence tests were sometimes used to document scientists’ misguided assumptions about the innate

inferiority of certain ethnic and immigrant groups.

61-3 What is a *normal curve*, and what does it mean to say that a test has been *standardized* and is *reliable* and *valid?*

- The distribution of test scores often forms a *normal* (bell-shaped) *curve* around the central average score, with fewer and fewer scores at the extremes.
- *Standardization* establishes a basis for meaningful score comparisons by giving a test to a representative sample of future test-takers.
- *Reliability* is the extent to which a test yields consistent results (on two halves of the test, or when people are retested).
- *Validity* is the extent to which a test measures or predicts what it is supposed to.
    - A test has *content validity* if it samples the pertinent behavior (as a driving test measures driving ability).
    - It has *predictive validity* if it predicts a behavior it was designed to predict. (Aptitude tests have predictive ability if they can predict future achievements.)

Multiple-Choice Questions

1. A test developer defines uniform testing procedures and meaningful scores by comparison with the performance of a pretested group. Which of the following best describes this process?

a. Reliability testing
b. Validation
c. Content validation
d. Standardization
e. Predictive validity

2. Which of the following is the best example of an aptitude test?

a. Atul answers questions about the rules of the road.

   b. Mr. Anderson's AP® psychology test covers the material from the current unit.
   c. Sherjeel takes the ACT for college admission.
   d. Jeffrey is required to translate 50 Mandarin sentences for his final exam.
   e. Lucy and Meghan discuss what they might study in college.

3. If a test yields consistent results upon retesting, it can be said to have a high degree of

   a. reliability.
   b. validity.
   c. content validity.
   d. predictive validity.
   e. normal curve.

4. Which of the following can be used to demonstrate that only about 2 percent of the population scores at least two standard deviations above the mean on an intelligence test?

   a. Reliability test
   b. Aptitude test
   c. Predictive validity test
   d. Test-retest procedure
   e. Normal curve

Practice FRQs

1. Ms. Pilai has given her class their final exam and has discovered that their scores formed a perfect normal curve, with a standard deviation of 10.

- If the mean score of the test was 72, what percentage of students scored between 62 and 82?
- What range of scores would be within three standard deviations of the mean?
- What percentage of the scores would be within two standard

deviations of the mean?

Answer

1 point: 68 percent of the students would have scored between 62 and 82—within one standard deviation of the mean. Page 636

1 point: The range of scores within three standard deviations would be 42–102. Page 636

1 point: 95 percent of all scores would be within two standard deviations of the mean. Page 636

2. Name and briefly describe the three essential principles of test construction.

(3 points)

Module **62 The Dynamics of Intelligence**

LEARNING TARGETS

- 62-1 Analyze how aging affects crystallized and fluid intelligence.
- 62-2 Define *cross-sectional studies* and *longitudinal studies*, and explain why it is important to know which method was used.
- 62-3 Describe the stability of intelligence test scores over the life span.
- 62-4 Discuss the traits of those at the low and high intelligence extremes.

Researchers are exploring some age-old questions about human intelligence. You know it: You are smarter than some people and not as smart as others. So what in that heart of smarts—the brain—creates this difference? Is it our brain’s relative *size?* Our amounts of certain brain *tissue?* Our brain networks’ *speed?* These are among the possibilities that researchers have identified.

Here we will focus on two other questions: How stable is intelligence over the life span? (Will the precocious 5-year-old mature into a talented college student and a brilliant senior citizen?) And what are the traits and talents of those at the low and high extremes of intelligence?

Stability or Change?

What happens to our intellectual muscles as we age? Do they gradually decline, as does our body strength? Or do they remain constant? To see how psychologists have studied intelligence, see Thinking Critically About: Cross-Sectional and Longitudinal Studies. The quest for answers to these questions illustrates psychology's self-correcting process.

Aging and Intelligence

62-1 How does aging affect crystallized and fluid intelligence?

Flip It Video: Fluid & Crystallized Intelligence

With the results of cross-sectional studies showing that older adults give fewer correct answers on intelligence tests than do younger adults, WAIS-creator David Wechsler (1972) concluded that "the decline of mental ability with age is part of the general [aging] process of the organism as a whole." For a long time, this rather dismal view went unchallenged. Many corporations established mandatory retirement policies, assuming the companies would benefit by replacing aging workers with younger, more capable employees. As the saying goes, you can't teach an old dog new tricks.

FYI

Like older people, older gorillas process information more slowly (Anderson et al., 2005).

After colleges in the 1920s began giving intelligence tests to entering students, several psychologists saw their chance to study intelligence *longitudinally*. They retested the same **cohort**—the same group of people—over a period of years (Schaie & Geiwitz, 1982). What they found was a surprise: Until late in life, intelligence remained stable. On some tests, scores even increased, due partly to experience with the tests (Salthouse, 2014) (**Figure 62.1**).

cohort

a group of people sharing a common characteristic, such as from a given time period.

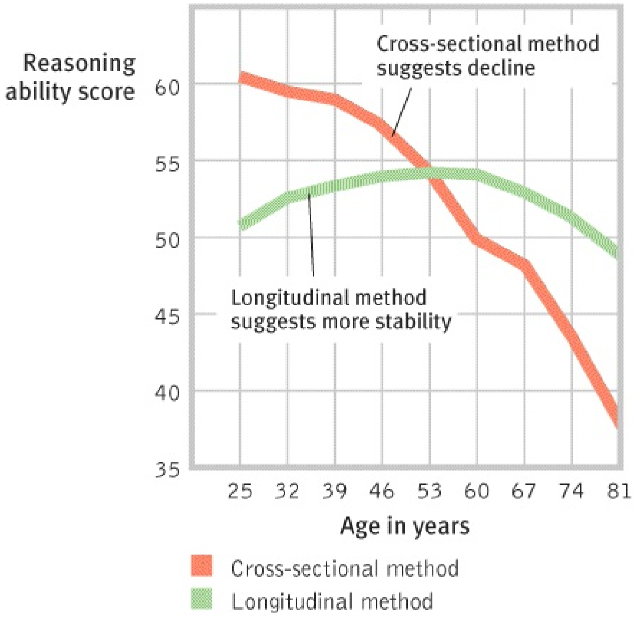


Figure 62.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Schaie, 1994.

Figure 62.1 Cross-sectional versus longitudinal testing of intelligence at various ages

In this test of one type of verbal intelligence (inductive reasoning), the cross-sectional method showed declining scores with age. The longitudinal method (in which the same people were retested over a period of years) showed a slight rise in scores well into adulthood.

The more optimistic results from longitudinal studies challenged the presumption that intelligence sharply declines with age. Famed painter Anna Mary Robertson Moses ("Grandma Moses") took up painting in her seventies, and at age 88 a popular magazine named her "Young Woman of the Year." At age 89, architect Frank Lloyd Wright designed New York City's Guggenheim Museum. As the saying goes, you're never too old to learn.

So the answers to our age-and-intelligence questions depend on what we assess and how we assess it. **Crystallized intelligence**—our accumulated knowledge as reflected in vocabulary and analogies tests—increases up to old age. **Fluid intelligence**—our ability to reason speedily and abstractly, as when solving novel logic problems—decreases beginning in the twenties and thirties, slowly up to age 75 or so, then more rapidly, especially after age 85 (Deary & Ritchie, 2016; Horn, 1982; Salthouse, 2009; 2013). With age, we lose and we win. We lose recall memory and processing speed, but we gain vocabulary and knowledge (Ackerman, 2014; **Figure 62.2**). Fluid intelligence may decline, but older adults' social reasoning skills increase, as shown by an ability to take multiple perspectives, to appreciate knowledge limits, and to offer helpful wisdom in times of social conflict (Grossmann et al., 2010). Decisions also become less distorted by negative emotions such as anxiety, depression, and anger (Blanchard-Fields, 2007; Carstensen & Mikels, 2005).

crystallized intelligence

our accumulated knowledge and verbal skills; tends to increase with age.

fluid intelligence

our ability to reason speedily and abstractly; tends to decrease with age, especially during late adulthood.

cross-sectional study

research that compares people of different ages at the same point in time.

longitudinal study

research that follows and retests the same people over time.

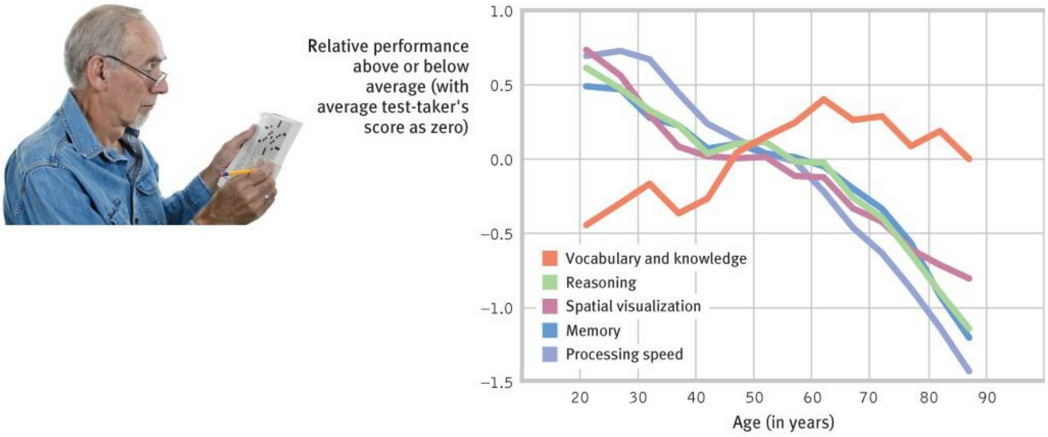


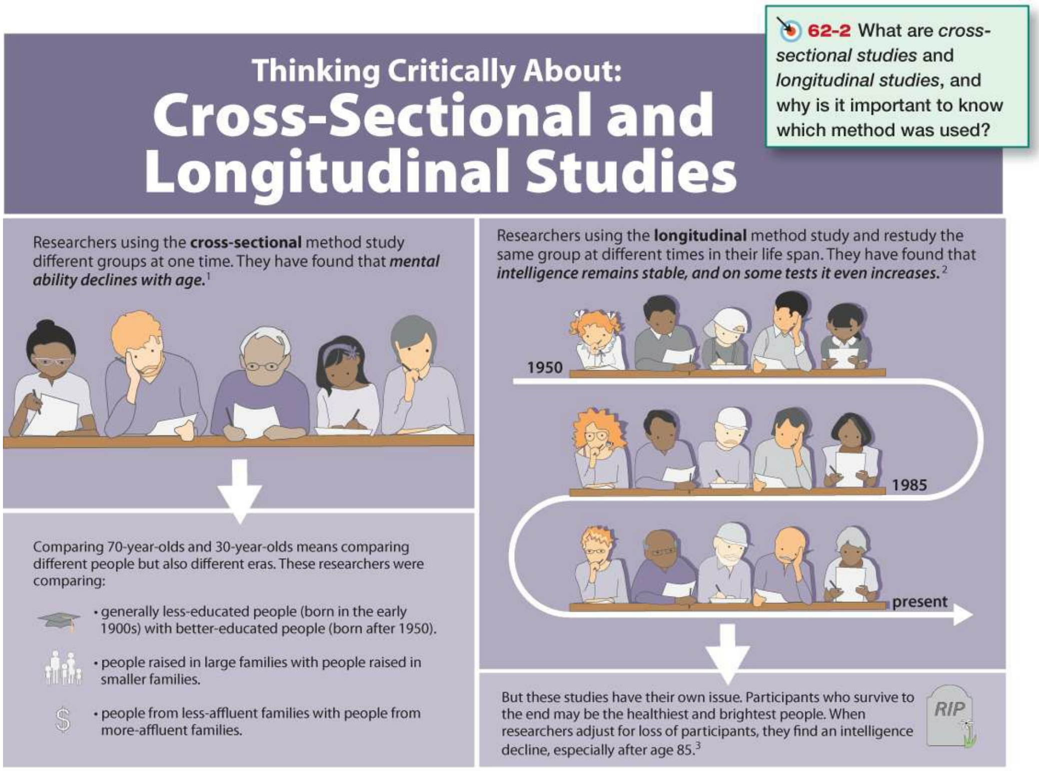
Figure 62.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Salthouse, 2010.
Photo: Ann Baldwin/Shutterstock

Figure 62.2 With age, we lose and we win

Studies reveal that word power grows with age, while fluid intelligence declines.

> *"Knowledge is knowing a tomato is a fruit; wisdom is not putting it in a fruit salad."*
>
> *Anonymous*

62-2 What are *cross-sectional studies* and *longitudinal studies*, and why is it important to know which method was used?



Thinking Critically About:
Cross-Sectional and Longitudinal Studies

Researchers using the **cross-sectional** method study different groups at one time. They have found that ***mental ability declines with age.***[1]

Comparing 70-year-olds and 30-year-olds means comparing different people but also different eras. These researchers were comparing:

- generally less-educated people (born in the early 1900s) with better-educated people (born after 1950).
- people raised in large families with people raised in smaller families.
- people from less-affluent families with people from more-affluent families.

Researchers using the **longitudinal** method study and restudy the same group at different times in their life span. They have found that ***intelligence remains stable, and on some tests it even increases.***[2]

But these studies have their own issue. Participants who survive to the end may be the healthiest and brightest people. When researchers adjust for loss of participants, they find an intelligence decline, especially after age 85.[3]

1. Wechsler, 1972. 2. Salthouse, 2010, 2014; Schaie & Geiwitz, 1982. 3. Brayne et al., 1999.

Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Age-related cognitive differences help explain why older adults are less likely to embrace new technologies (Charness & Boot, 2009; Pew, 2017). These cognitive differences also help explain why mathematicians and scientists produce much of their most creative work during their late twenties or early thirties, when fluid intelligence is at its peak (Jones et al., 2014). In contrast, authors, historians, and philosophers tend to produce their best work in their forties, fifties, and beyond—after accumulating more knowledge (Simonton, 1988, 1990). Poets, for example, who depend on fluid intelligence, reach their peak output earlier than prose authors, who need the deeper knowledge reservoir that accumulates with age. This finding holds across literary traditions, for both living and dead languages.

AP® EXAM TIP

Students tend to confuse crystallized and fluid intelligence. Be able to identify examples of each and whether they generally increase or decrease with age. It might help you to think about how crystals grow larger over time, as does our knowledge (crystallized intelligence).

Stability Over the Life Span

62-3 How stable are intelligence test scores over the life span?

What about the stability of early-life intelligence scores? For most children, casual observation and intelligence tests before age 3 only modestly predict their future aptitudes (Humphreys & Davey, 1988; Tasbihsazan et al., 2003). Even Albert Einstein was once thought “slow”—as he was in learning to talk (Quasha, 1980).

> “*In youth we learn, in age we understand.*”
>
> *Marie Von Ebner-Eschenbach,* Aphorisms, *1883*

By age 4, however, children’s performance on intelligence tests begins to predict their adolescent and adult scores. The consistency of scores over time increases with the age of the child (Tucker-Drob & Briley, 2014). By age 11, the stability becomes impressive, as Ian Deary and his colleagues (2004, 2009b, 2013) discovered. Their amazing longitudinal studies have been enabled by their country, Scotland, doing something that no nation has done before or since. On June 1, 1932, essentially every child in the country born in 1921—87,498 children around age 11—took an intelligence test. The aim was to identify working-class children who would benefit from further education. Sixty-five years later to the day, Patricia Whalley, the wife of Deary's co-worker, Lawrence Whalley, discovered the test results on dusty storeroom shelves at the Scottish Council for Research in Education, not far from Deary's Edinburgh University office. "This will change our lives," Deary replied when Whalley told him the news.

> “*My dear Adele, I am 4 years old and I can read any English book. I can say all the Latin substantives and adjectives and active verbs besides 52 lines of Latin poetry.*”
>
> *Francis Galton, letter to his sister, 1827*

And so it has, with dozens of studies of the stability and the predictive capacity of these early test results. For example, when the intelligence test administered to 11-year-old Scots in 1932 was readministered to 542 survivors as turn-of-the-millennium 80-year-olds, the correlation between the two sets of scores—after nearly 70 years of varied life experiences—was striking (**Figure 62.3**). Ditto when 106 survivors were retested at age 90 (Deary et al., 2013). Another study that followed Scots born in 1936 from ages 11 to 70 confirmed the remarkable stability of intelligence, independent of life circumstance (Johnson et al., 2010).

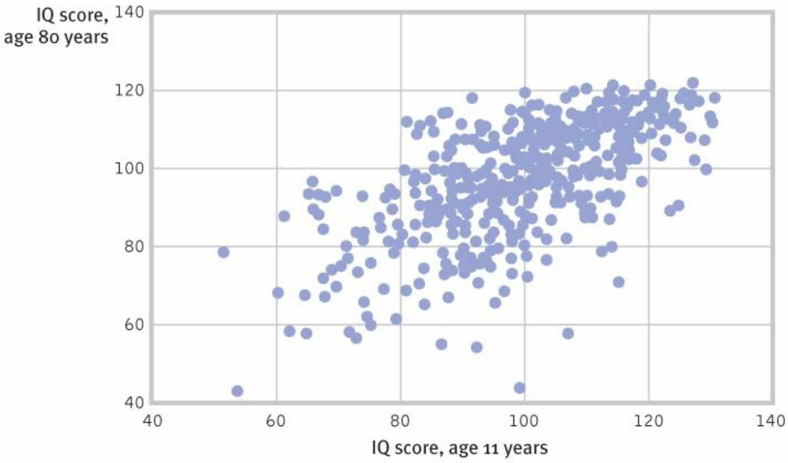


Figure 62.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Deary et al., 2004.

Figure 62.3 Intelligence endures

When Ian Deary and his colleagues retested 80-year-old Scots using an intelligence test they had taken as 11-year-olds, their scores across seven decades correlated +0.66, as shown here. When 106 survivors were again retested at age 90, the correlation with their age 11 scores was +0.54 (Deary et al., 2013).

Children and adults who are more intelligent also tend to live healthier and longer lives (**Figure 62.4**). Why might this be the case? Deary (2008) reports four possible explanations:

1. Intelligence facilitates more education, better jobs, and a healthier environment.
2. Intelligence encourages healthy living: less smoking, better diet, more exercise.
3. Prenatal events or early childhood illnesses might have influenced both intelligence and health.
4. A "well-wired body," as evidenced by fast reaction speeds, perhaps fosters both intelligence and longevity. (Intelligent people tend to be literally quick-witted—to perceive and respond to stimuli quickly.)

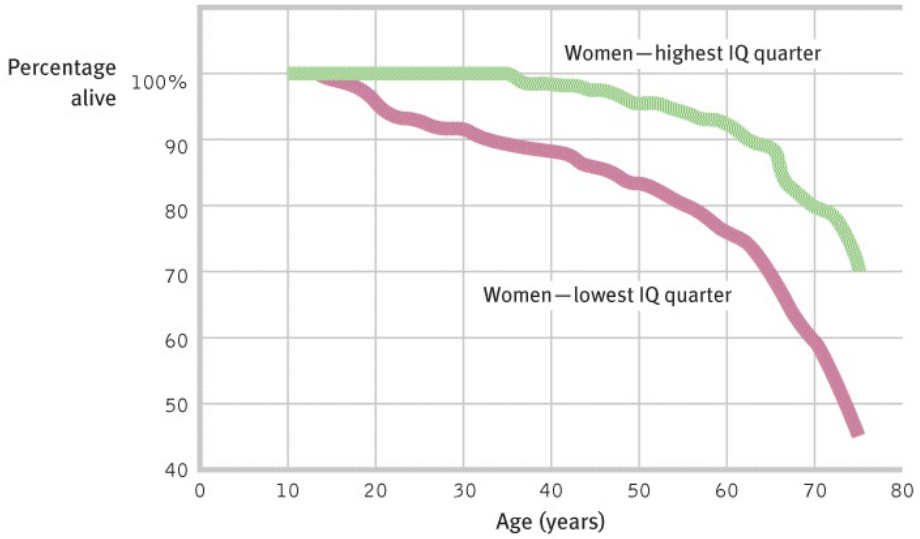


Figure 62.4
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Whalley & Deary, 2001.

Figure 62.4 Living smart

Women scoring in the highest 25 percent on the Scottish national intelligence test at age 11 tended to live longer than those who scored in the lowest 25 percent.

> “*Whether you live to collect your old-age pension depends in part on your IQ at age 11.*”
>
> *Ian Deary, “Intelligence, Health, and Death,” 2005*

Extremes of Intelligence

62-4 What are the traits of those at the low and high intelligence extremes?

One way to glimpse the validity and significance of any test is to compare people who score at the two extremes of the normal curve. The two groups should differ noticeably, and on intelligence tests, they do.

The Low Extreme

Intellectual disability (formerly called *mental retardation*) is a developmental condition that is apparent before age 18, sometimes with a known physical cause. (**Down syndrome**, for example, is a disorder of varying intellectual and physical severity caused by an extra copy of chromosome 21 in the person's genetic makeup.) To be diagnosed with an intellectual disability, a person must meet two criteria. The first is low intellectual functioning as reflected in a low intelligence test score. Guidelines specify test score performance that is in the lowest 3 percent of the general population, or about 70 or below (Schalock et al., 2010). The second criterion is that the person must have difficulty adapting to the normal demands of independent living, as expressed in three areas, or skills: *conceptual* (language, reading, and concepts of money, time, and number), *social* (interpersonal skills, being socially responsible, following basic rules and laws, avoiding being victimized), and *practical* (health and personal care, occupational skill, and travel). In mild forms, intellectual disability, like normal intelligence, results from a combination of genetic and environmental factors (Reichenberg et al., 2016).

intellectual disability

a condition of limited mental ability, indicated by an intelligence test score of 70 or below and difficulty adapting to the demands of life. (Formerly referred to as *mental retardation*.)

Down syndrome

a condition of mild to severe intellectual disability and associated physical disorders caused by an extra copy of chromosome 21.

Claudia Daut/Reuters/Newscom

Mainstreaming in Chile Most Chilean children with Down syndrome have attended separate schools for children with special needs. However, this boy is a student at the Altamira School, where children with differing abilities share the classrooms.

When, thanks to the *Flynn effect*, intelligence tests are periodically restandardized, the intellectual-disability test score boundary can shift. Depending on when they were tested, two people with the same ability level could be classified differently (Kanaya et al., 2003; Reynolds et al., 2010). After one restandardization, individuals who scored near 70 on earlier tests suddenly lost about 6 test score points. As this has occurred, more people have become eligible for special education and financial assistance.

For some, intelligence test scores can mean life or death. In the United States (one of the only industrialized countries with the death penalty), the Flynn effect means fewer Americans are now eligible for execution: The U.S. Supreme Court ruled in 2002 that the execution of people with an intellectual disability—defined as a test score of below 70—is “cruel and unusual punishment.” For Teresa Lewis, that cutoff was high stakes. Lewis, a “dependent personality” with limited intellect, allegedly agreed to a plot in which two men killed her husband and stepson in exchange for a split of a life insurance payout (Eckholm, 2010). With a reported test score of 72, the State of Virginia executed Lewis in 2010. If only she had scored 69.

In 2014, the U.S. Supreme Court recognized the imprecision and arbitrariness of a fixed cutoff score of 70, and required states with death row inmates who have scored just above 70 to consider other evidence. Thus, Ted Herring, who had scored 72 and 74 on intelligence tests—but without knowing that summer follows spring or how to transfer between buses—was taken off Florida's death row (Alvarez & Schwartz, 2014).

FYI

Terman did test two future Nobel laureates in physics, but they failed to score above his gifted sample cutoff (Hulbert, 2005).

The High Extreme

Children whose intelligence test scores indicate extraordinary academic gifts mostly thrive. In one famous project begun in 1921, Lewis Terman studied more than 1500 California schoolchildren with IQ scores over 135. These high-scoring children (later called the "Termites"), like those in later studies, were healthy, well-adjusted, and unusually successful academically (Friedman & Martin, 2012; Koenen et al., 2009; Lubinski, 2009, 2016). When restudied over the next seven decades, most people in Terman's group had attained high levels of education (Austin et al., 2002; Holahan & Sears, 1995). Many were doctors, lawyers, professors, scientists, and writers, though none were Nobel Prize winners.

FYI

Among the high-scoring whiz kids in national searches for precocious youth were Google co-founder Sergey Brin, Facebook's Mark Zuckerberg, and musician Stefani Germanotta (Lady Gaga) (Clynes, 2016). Another became a professional poker player with $100,000+ annual earnings (Lubinski, 2016).

Other studies have followed the lives of precocious youths who had aced the math SAT at age 13—by scoring in the top 1 percent of their age group. By their fifties, these 1650 math whizzes had secured 681 patents (Lubinski et al., 2014). Another group of 13-year-old verbal aptitude high scorers were, by age 38, twice as likely as the math aces to have become humanities professors or written a novel (Kell et al., 2013). About 1 percent of Americans earn doctorates. But for the 12- and 13-year-olds who scored in the top 1 in 10,000 among those of their age taking the SAT, about 4 in 10 had done so (Kell et al., 2013; Makel et al., 2016). One of psychology's whiz kids was Jean Piaget, who by age 15 was publishing scientific articles on mollusks and who went on to become the twentieth century's most famous developmental psychologist (Hunt, 1993).

Is there a gifted education program at your school? "Gifted child" programs tend to segregate high-scoring children in special classes, giving them academic enrichment not available to their peers. Critics note that tracking by aptitude sometimes creates a self-fulfilling prophecy: Implicitly labeling some children as "ungifted" and denying them opportunities for enriched education can widen the achievement gap between ability groups (Lipsey & Wilson, 1993; Stevenson & Lee, 1990). Because minority and low-income youth are more often placed in lower academic groups, tracking can also promote segregation and prejudice—hardly, note critics, a healthy preparation for working and living in a multicultural society.

MATHEMATICAL SCIENCE BUILDING

JOE KLAMAR/Getty Images

The extremes of intelligence Moshe Kai Cavalin completed his third college degree by the time he was 14, when the math major graduated from UCLA.

According to his mother, he first picked up a college textbook and started reading it at age 2.

Critics and proponents of gifted education do, however, agree on this: Children have differing gifts, whether at math, verbal reasoning, art, or social leadership. Some children exhibit exceptional potential or talent in a given domain. Educating children as if all were alike is as naive as assuming that giftedness is something, like blue eyes, that you either have or do not have. One need not stick labels on children to affirm their special talents and to challenge them all at the frontiers of their own ability and understanding. By providing *appropriate placement* suited to each child's talents (as when allowing a math whiz to study math at a higher level), we can promote both equity and excellence for all (Subotnik et al., 2011).

✓ Check Your Understanding

Ask Yourself

- How do you feel about placing children of all ability levels in the same classroom? What evidence are you using to support your view?

Test Yourself

- Researcher A is well-funded to learn about how intelligence changes over the life span. Researcher B wants to study the intelligence of people who are now at various life stages. Which researcher should use the cross-sectional method, and which the longitudinal method?
- Why do psychologists not diagnose an intellectual disability based solely on a person's intelligence test score?
- The Smiths have enrolled their 2-year-old son in a special program that promises to assess his IQ and, if he places in the top 5 percent of test-takers, to create a plan that will guarantee his admission to a top university at age 18. Why is this endeavor of questionable value?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 62 REVIEW

62-1 How does aging affect crystallized and fluid intelligence?

- Cross-sectional studies and longitudinal studies have shown that *fluid intelligence* declines in older adults, in part because neural processing slows. *Crystallized intelligence* tends to increase.

62-2 What are *cross-sectional studies* and *longitudinal studies*, and why is it important to know which method was used?

- *Cross-sectional studies* compare people of different ages at the same point in time. *Longitudinal studies* follow and retest the same *cohort* over a period of years.
- Cross-sectional studies also compare people of different eras and life circumstances. This can provide an excellent snapshot of a particular point in time, but longitudinal studies are better equipped to trace the evolution of traits over a longer time period.

62-3 How stable are intelligence test scores over the life span?

- The stability of intelligence test scores increases with age.
  - At age 4, scores fluctuate somewhat but begin to predict adolescent and adult scores.
  - By early adolescence, scores are very stable and predictive.

62-4 What are the traits of those at the low and high intelligence extremes?

- An intelligence test score of or below 70 is one diagnostic criterion for the diagnosis of *intellectual disability* (others are limited conceptual, social, and practical skills).

- *Down syndrome*, a developmental disorder caused by an extra copy of chromosome 21, is one known physical cause of intellectual disability.
- High-scoring people tend to be healthy and well-adjusted, as well as unusually successful academically.
    - Schools sometimes “track” such children, separating them from students with lower scores. Such programs can become self-fulfilling prophecies as both groups live up to—or down to—others’ perceptions and expectations.

Multiple-Choice Questions

1. Which of the following is a longitudinal study?

   a. Researchers test the intelligence of all the students in a high school.
   b. Intelligence tests are given to the residents of a nursing home.
   c. Researchers randomly select 50 students from a high school with 2000 students. The 50 students are given intelligence tests.
   d. A group of college juniors is given an extensive battery of tests over a period of 2 days.
   e. A group of kindergartners is given an intelligence test. They are retested every other year for 30 years.

2. Which of the following best represents crystallized intelligence?

   a. Jake can solve math word problems quickly.
   b. Grandpa Milt is good at crossword puzzles.
   c. Aliyah has a knack for training dogs.
   d. Anna writes creative computer programs.
   e. Heng takes a different route each day on his walk.

3. Hal scored an 89 on an intelligence test when he was 16. Now, at age 56, he is interested in what his score would be as an adult. The score he is most likely to earn on the new test would be

   a. 49.
   b. 70.
   c. 92.

d. 129.
e. 140.

4. Intellectual disability is defined by both IQ and which of the following?

a. Chronological age
b. Mental age
c. Adaptive ability
d. Physical condition
e. Heritability

Practice FRQs

1. Describe how each of the following types of evidence are used to determine whether there is an intellectual decline as people age.

- Evidence from cross-sectional studies
- Evidence from longitudinal studies

Answer

2 points: Cross-sectional studies would test people from several age groups at once. This type of study would examine a group of younger people and a group of older people at one point in time and compare their test scores to see if those in the older group had lower scores. Page 641

2 points: Longitudinal studies would test the same group of people periodically over a long period of time. This type of study would compare individuals’ test scores at varying ages to see if there is a decline as the participants grow older. Page 641

2. Provide three pieces of evidence that explain why more intelligent people might live longer.

(3 points)

Module 63 Studying Genetic and Environmental Influences on Intelligence

LEARNING TARGETS

- 63-1 Analyze the evidence for a genetic influence on intelligence, and explain what is meant by *heritability*.
- 63-2 Analyze the evidence for environmental influences on intelligence.

Intelligence runs in families. But why? Are our intellectual abilities mostly inherited? Or are they molded by our environment? Few issues arouse so much passion. If we mainly inherit our intelligence, then people’s socioeconomic standing will correspond to their inborn differences. But if intelligence is mainly nurtured by our environments, then children from disadvantaged backgrounds can expect to lead disadvantaged lives—but with some hope that changing the environment could produce more intelligent and accomplished adults. Let’s examine some of the evidence.

Twin and Adoption Studies

63-1 What evidence points to a genetic influence on intelligence, and what is *heritability*?

Do people who share the same genes also share mental abilities? As you can see from **Figure 63.1**, which summarizes many studies, the answer is clearly *Yes*. Consider:

- The intelligence test scores of identical twins raised together are nearly as similar as those of the same person taking the same test twice (Haworth et al., 2009; Lykken, 2006; Plomin et al., 2016). (The scores of fraternal twins, who share only about half their genes, differ more.) Estimates of the **heritability** of intelligence—the extent to which intelligence test score variation within a group can be attributed to genetic variation—range from 50 to 80 percent (Madison et al., 2016; Plomin et al., 2016). Identical twins also exhibit substantial similarity (and heritability) in specific talents, such as music, math, and sports. Heredity accounts for more than half the variation in the national math and science exam scores of British 16-year-olds (Shakeshaft et al., 2013; Vinkhuyzen et al., 2009).
- Scans reveal that identical twins' brains have similar gray- and white-matter volume, and the areas associated with verbal and spatial intelligence are virtually the same (Deary et al., 2009a; Thompson et al., 2001). Their brains also show similar activity while doing mental tasks (Koten et al., 2009).
- Are there known genes for genius? When 200 researchers pooled their data on 126,559 people, all of the gene variations analyzed accounted for only about 2 percent of the differences in educational achievement (Rietveld et al., 2013, 2014). This result was not a fluke; others have replicated this modest effect of genes on educational achievement (Belsky et al., 2016). And using a new genetic method, a follow-up British study recently found genes that predicted 9 percent of the

variation in school achievement at age 16 (Selzam et al., 2016). This much seems clear: *Intelligence is polygenetic*, involving many genes. Wendy Johnson (2010) likens the polygenetic effect to height: 54 specific gene variations together account for 5 percent of our individual height differences, leaving the rest yet to be discovered. What matters for intelligence—as for height, personality, sexual orientation, schizophrenia or just about any human trait—is the combination of many genes (Plomin et al., 2016).

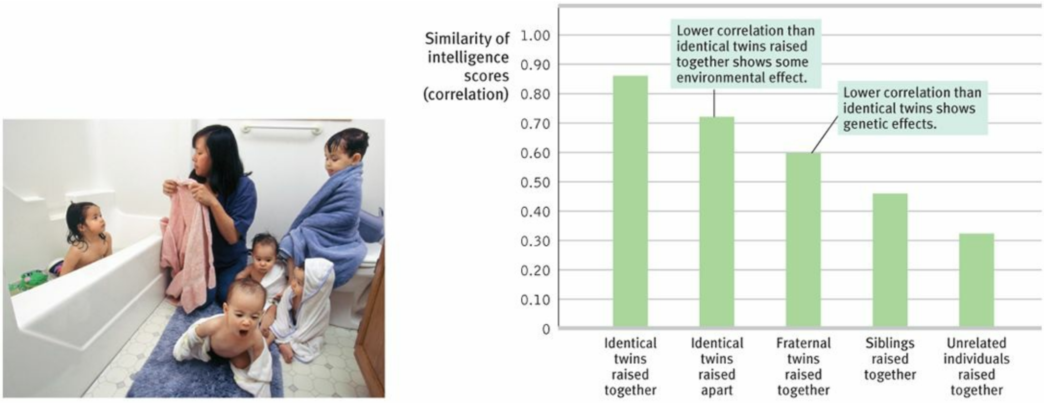


Figure 63.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from McGue et al., 1993.
Photo: Christopher Fitzgerald/The Image Works

Figure 63.1 Intelligence: Nature and nurture

The most genetically similar people have the most similar intelligence scores. Remember: 1.00 indicates a perfect correlation; zero indicates no correlation at all.

Donald Reilly The New Yorker Collection
/The Cartoon Bank

“I told my parents that if grades were so important they should have paid for a smarter egg donor.”

heritability
the proportion of variation among individuals in a group that we can attribute to genes. The heritability of a trait may vary, depending on the range of populations and environments studied.

Other evidence points to environment effects:

- Where environments vary widely, as they do among children of less-educated parents, environmental differences are more predictive of intelligence scores (Tucker-Drob & Bates, 2016).
- Adoption enhances the intelligence scores of mistreated or neglected children (van IJzendoorn & Juffer, 2005, 2006). So does adoption from poverty into middle-class homes (Nisbett et al., 2012). In one large Swedish study, children adopted into wealthier families with more educated parents had IQ scores averaging 4.4 points higher than their not-adopted biological siblings (Kendler et al., 2015).
- The intelligence scores of “virtual twins”—same-age, unrelated siblings adopted as infants and raised together—correlate +0.28 (Segal et al., 2012). This suggests a modest influence of their shared environment.

AP® EXAM TIP

Figure 63.1 is worth spending some time on. Try grabbing a study buddy and explaining whether each of the five conditions provides more support for nature or more for nurture. In most cases, it’s some of each and you have to look at comparisons between categories to really be able to draw conclusions.

Seeking to disentangle genes and environment, researchers have also compared the intelligence test scores of adopted children with those of (a) their *biological parents* (the providers of their genes) and (b) their *adoptive parents* (the providers of their home environment). Over time, adopted children accumulate experience in their differing adoptive families. So, would you expect the family-environment effect to grow with age and the genetic-legacy effect to shrink?

If you would, behavior geneticists have a stunning surprise for you. Mental similarities between adopted children and their adoptive families wane with age (McGue et al., 1993). Adopted children's intelligence scores resemble those of their biological parents much more than their adoptive parents (Loehlin, 2016). Genetic influences—not environmental ones—become more apparent as we accumulate life experience. Identical twins' similarities, for example, continue or increase into their eighties. Thus, report Ian Deary and his colleagues (2009a, 2012), the heritability of general intelligence increases from "about 30 percent" in early childhood to "well over 50 percent in adulthood." In one massive study of 11,000 twin pairs in four countries, the heritability of general intelligence (*g)* increased from 41 percent in middle childhood to 55 percent in adolescence to 66 percent in young adulthood (Haworth et al., 2010). Similarly, adopted children's verbal ability scores over time become more like those of their biological parents (**Figure 63.2**). Who would have guessed?

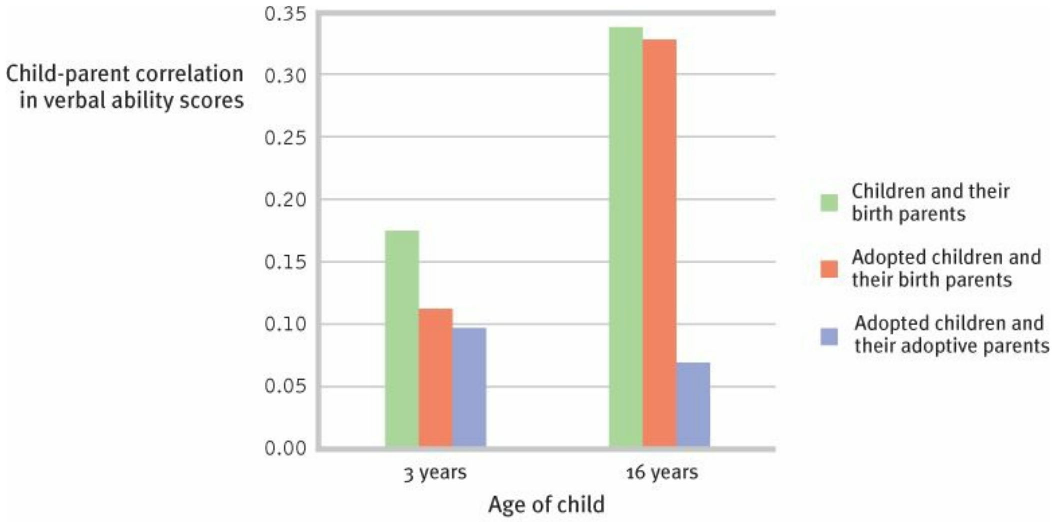
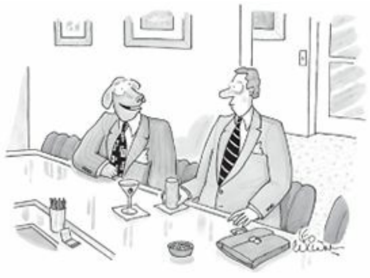


Figure 63.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Plomin & DeFries, 1998.

Figure 63.2 In verbal ability, whom do adopted children resemble?

As the years went by in their adoptive families, children's verbal ability scores became more like their *biological* parents' scores.



Leo Cullum/The New Yorker Collection/The Cartoon Bank

"Selective breeding has given me an aptitude for the law, but I still love fetching a dead duck out of freezing water."

Environmental Influences

63-2 What does evidence reveal about environmental influences on intelligence?

Genes matter. Even if we were all raised in the same intellectually stimulating environment, we would have differing aptitudes. But life experiences also matter. Human environments are rarely as impoverished as the dark and barren cages inhabited by deprived rats that develop thinner-than-normal brain cortexes (Rosenzweig, 1984; see Module 50). Yet severe deprivation also leaves footprints on the human brain.

Early Environmental Influences

Nowhere is the intertwining of biology and experience more apparent than in the most hopeless human environments, such as J. McVicker Hunt (1982) observed in a destitute Iranian orphanage. The typical child Hunt observed there could not sit up unassisted at age 2 or walk at age 4. The little care the infants received was not in response to their crying, cooing, or other behaviors, so the children developed little sense of personal control over their environment. They were instead becoming passive "glum lumps." Extreme deprivation was bludgeoning native intelligence—a finding confirmed by studies of children raised in poorly run orphanages in Romania and elsewhere (Nelson et al., 2009, 2013; van IJzendoorn et al., 2008).

Josef Polleross/The Image Works

Devastating neglect Some Romanian orphans, such as this child in the

Leaganul Pentru Copii orphanage in 1990, had minimal interaction with caregivers and suffered delayed development.

Aware of both the dramatic effects of early experiences and the impact of early intervention, Hunt began a training program for the Iranian caregivers, teaching them to play language-fostering games with 11 infants. They imitated the babies' babbling, engaged them in vocal follow-the-leader, and, finally, they taught the infants sounds from the Persian language. The results were dramatic. By 22 months of age, the infants could name more than 50 objects and body parts, and so charmed visitors that most were adopted—an unprecedented success for the orphanage.

Hunt's findings are an extreme case of a more general finding: Poor environmental conditions can depress cognitive development. Schools with many poverty-level children often have less-qualified teachers, as one study of 1450 Virginia schools found (Tuerk, 2005). And these factors predicted lower achievement scores.

Poverty-related stresses also impede cognitive *performance* (Heberle & Carter, 2015). Like a computer that slows when running multiple operations, impoverished people's worries and distractions consume cognitive bandwidth and can diminish their thinking capacity. For example, on tests of cognitive functioning, sugar cane farmers in India scored better after being paid for their harvest—when their money worries dropped (Mani et al., 2013). Poverty can deplete cognitive capacity.

So, extreme conditions—sensory deprivation, social isolation, poverty—can slow normal brain development. Is the reverse also true? Will an "enriched" environment give children a superior intellect? Most experts are doubtful (Bruer, 1999; DeLoache et al., 2010; Reichert et al., 2010). There is no environmental recipe for fast-forwarding a normal infant into a genius. All babies should have normal exposure to sights, sounds, and speech. Although preschool experiences matter, Sandra Scarr's (1984) verdict still is widely shared: "Parents who are very concerned about providing special educational lessons for their babies are wasting their time."

Schooling and Intelligence

Early Intervention

Later in childhood, schooling is one intervention that pays intelligence score dividends. Schooling and intelligence interact, and both enhance later income (Ceci & Williams, 1997, 2009). Hunt was a strong believer in the ability of education to boost children’s chances for success by developing their cognitive and social skills. Indeed, his 1961 book, *Intelligence and Experience*, helped launch Project Head Start in 1965, a U.S. government-funded preschool program that has served more than 30 million children, most of whom come from families below the poverty level (Head Start, 2013). Does it succeed? Studies suggest that Head Start increases school readiness and gives a modest boost to later health and high school completion rate (Deming, 2009; Mervis, 2011; Pianta et al., 2009). Generally, however, aptitude benefits fade out over time (reminding us that life experiences *after* Head Start matter, too).

More encouraging results come from intensive post-babyhood preschool programs (Dodge et al., 2017; Garcia et al., 2016; Tucker-Drob, 2012). Across a number of experiments, intelligence scores also rise with nutritional supplements to pregnant mothers and newborns (3.5 points), with quality preschool experiences (4 points), and with interactive reading programs (6 points) (Protzko et al., 2013).

Genes and experience together weave the fabric of intelligence. (Recall from Module 14 that *epigenetics* is one field that studies this nature–nurture meeting place.) But what we accomplish with our intelligence depends also on our own beliefs and motivation. One analysis of 72,431 undergraduates found that study motivation and study skills rivaled aptitude and previous grades as predictors of academic achievement (Credé & Kuncel, 2008). Motivation can even affect intelligence test performance. Four dozen studies show that, when promised money for doing well, adolescents score higher on such tests (Duckworth et al., 2011).

Growth Mindset

These observations would not surprise psychologist Carol Dweck (2006, 2015a,b, 2016). She reports that believing intelligence is changeable, not fixed, fosters a *growth mindset,* a focus on learning and growing. Dweck teaches young teens that the brain is like a muscle, growing stronger with use as neuron connections grow: “Learning how to do a new kind of problem grows your math brain!” Receiving praise for *effort and for tackling challenges,* rather than being smart or accomplished, helps teens understand the link between hard work and success (Gunderson et al., 2013). They also become more resilient when others frustrate them (Paunesku et al., 2015; Yeager et al., 2013, 2014, 2016a). Indeed, superior achievements in fields from sports to science to music arise from the combination of ability, opportunity, and disciplined effort (Ericsson et al., 2007).

> “*It is our choices . . . that show what we truly are, far more than our abilities.*”
>
> *Professor Dumbledore to Harry Potter in J. K. Rowling’s* Harry Potter and the Chamber of Secrets, *1999*

More than 300 studies confirm that ability + opportunity + motivation = success. Extremely high intelligence-test-scoring 12-year-olds are much more likely than the average person to later earn doctorates and hold patents—if their ability is “coupled with commitment” (Makel et al., 2016). High school students’ math proficiency and college students’ grades reflect their aptitude but also their self-discipline, their belief in the power of effort, and a curious, “hungry mind” (Murayama et al., 2013; Richardson et al., 2012; von Stumm et al., 2011). In a study of 168,000 Chilean tenth graders, those from the lowest-income families who had a growth mindset had academic test scores comparable to high-income students who had a fixed mindset (Claro et al., 2016). And consider: South Asian–Americans won all nine U.S. national spelling bee contests between 2008 and 2016, an incredible achievement likely influenced by a cultural belief that strong effort will bring success (Rattan et al., 2012; Shankar, 2016).

Dave Nagel/Getty Images

A hungry mind

Alex Wong/Getty Images

U.S. spelling champs Nihar Janga, 11, and Jairam Hathwar, 13, celebrate their co-winning the 2016 Scripps National Spelling Bee. What were Nihar and Jairam’s winning words? “Gesellschaft” and “Feldenkrais.”

These repeated findings—that a growth mindset and disciplined effort enhance achievement—have generated media attention and encouraged large-scale interventions with at-risk students. One downside, caution some researchers, is a possible overemphasis on positive thinking’s power to lift people out of disadvantage. Doing so comes at a social cost—blaming struggling individuals for their circumstances (Ikizer & Blanton, 2016). Sometimes people need more than the power of positive thinking to overcome their harsh conditions.

✓ Check Your Understanding

Ask Yourself

- How have genetic and environmental influences shaped your intelligence?

Test Yourself

- A check on your understanding of heritability: If environments become more equal, the heritability of intelligence will
  - a. increase.
  - b. decrease.
  - c. be unchanged.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 63 REVIEW

63-1 What evidence points to a genetic influence on intelligence, and what is *heritability?*

- Studies of twins, family members, and adoptees indicate a significant hereditary contribution to intelligence scores.
- Intelligence seems to be polygenetic, and researchers are searching for genes that exert an influence.
- *Heritability* is the proportion of variation among individuals that can be attributed to genes.

63-2 What does evidence reveal about environmental influences on intelligence?

- Studies of twins, family members, and adopted children provide evidence of environmental influences.
- Test scores of identical twins raised apart are slightly less similar (though still very highly correlated) than the scores of identical twins raised together.
- Studies of children raised in extremely impoverished environments with minimal social interaction indicate that life experiences can significantly influence intelligence test performance.
- No evidence supports the idea that normal, healthy children can be molded into geniuses by growing up in an exceptionally enriched environment.

Multiple-Choice Questions

1. Heritability relates to the

a. percentage of a person’s intelligence that is due to environmental influences.

b. percentage of a person’s intelligence that is due to genetics.
c. correlation of intelligence test scores among family members.
d. extent to which variability among individuals’ intelligence scores can be attributed to genetic variation.
e. genetic stability of intelligence over time.

2. There is a greater correlation between the IQ scores of identical twins raised together than for fraternal twins raised together. What conclusion can be drawn from this data?

a. There is no significant hereditary contribution to intelligence.
b. There is no significant environmental contribution to intelligence.
c. There is no significant genetic or environmental effect on intelligence.
d. There is a genetic effect on intelligence.
e. There is an environmental effect on intelligence.

3. Which of the following is true of the mental similarities between adoptive children and their adoptive parents over time?

a. Adoptive children become much more similar to their adoptive parents over time.
b. Adoptive children become slightly more similar to their adoptive parents over time.
c. There is hardly any similarity when the adoptive children are young or when they are older.
d. Adoptive children become slightly less similar to their adoptive parents over time.
e. Adoptive children become much less similar to their adoptive parents over time.

4. According to Carol Dweck, students are often hampered by a “fixed mindset.” This means they believe:

a. intelligence is biologically set and unchangeable.
b. it is never good to change your mind once it is made up.
c. intelligence is changeable.
d. they have already done everything they can to improve.

e. problems can only be solved in a particular way.

Practice FRQs

1. Explain whether each of the following comparisons demonstrates the influence of genetics or of environment on intelligence.

- The correlation of intelligence test scores for identical twins raised *together* is about +.85. For identical twins raised *apart*, the correlation is about +.72.
- The correlation of intelligence test scores for identical twins raised together is about +.85. For fraternal twins raised together, it is about +.60.

Answer

1 point: The first comparison demonstrates the influence of environment. The people being studied were genetically identical twins in both cases, so the higher correlation for identical twins raised together must be due to environment. Page 647

1 point: The second comparison demonstrates the influence of genetics. In both cases, the twins being studied were raised in the same environment, so the higher correlation for identical twins must be due to the fact that there is more genetic similarity between identical twins than between fraternal twins. Page 647

2. Explain two environmental interventions that can help children develop better cognitive skills.

(2 points)

Module **64 Group Differences and the Question of Bias**

LEARNING TARGETS

- 64-1 Examine how and why the genders differ in mental ability scores.
- 64-2 Examine how and why racial and ethnic groups differ in mental ability scores.
- 64-3 Discuss whether intelligence tests are inappropriately biased, and explain the influence of stereotype threat on test-takers' performance.

Group Differences in Intelligence Test Scores

If there were no group differences in aptitude scores, psychologists would have less debate over hereditary and environmental influences. But there are group differences. What are they? And what shall we make of them?

Gender Similarities and Differences

64-1 How and why do the genders differ in mental ability scores?

In science as in everyday life, it is differences, not similarities, that excite interest. In worldwide studies, men estimate their own intelligence higher than do females (Furnham, 2016). Yet compared with the anatomical and physiological differences between men and women, our intelligence differences are minor. In that 1932 testing of all Scottish 11-year-olds, for example, girls' average intelligence score was 100.6 and boys' was 100.5 (Deary et al., 2003). So far as *g* is concerned, boys and girls, and men and women, are the same.

Yet, most people find differences more newsworthy. Girls outpace boys in spelling, verbal fluency, locating objects, detecting emotions, and sensitivity to touch, taste, and color (Halpern et al., 2007; Voyer & Voyer, 2014). Boys outperform girls in tests of spatial ability and complex math problems, though in math computation and overall math performance, boys and girls hardly differ (Else-Quest et al., 2010; Hyde & Mertz, 2009; Lindberg et al., 2010). Males' mental ability scores also vary more than females'. Thus, boys worldwide outnumber girls at both the low extreme and the high extreme (Brunner et al., 2013). Boys, for example, are more often found in special education classes, but also among those scoring very high on the SAT math test.

FYI

Give females long-term testosterone therapy (for female-to-male sex reassignment) and their brain language processing areas become, after losing some gray matter, more male-like (Hahn et al., 2016).

The most reliable male edge appears in spatial ability tests like the one shown in **Figure 64.1** (Maeda & Yoon, 2013; Palejwala & Fine, 2015). The solution requires speedy mental rotation of three-dimensional objects. Today, such skills help when fitting suitcases into a car trunk, playing chess, or doing certain types of geometry problems. From an evolutionary perspective, those same skills would have helped our ancestral fathers track prey and make their way home (Geary, 1995, 1996; Halpern et al., 2007). The survival of our ancestral mothers may have benefited more from a keen memory for the location of edible plants—a legacy that lives today in women’s superior memory for objects and their location.

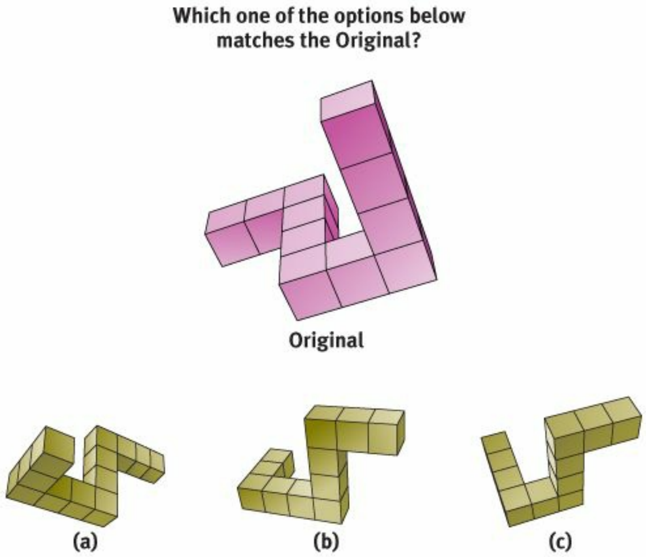


Figure 64.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 64.1 A mental rotation test

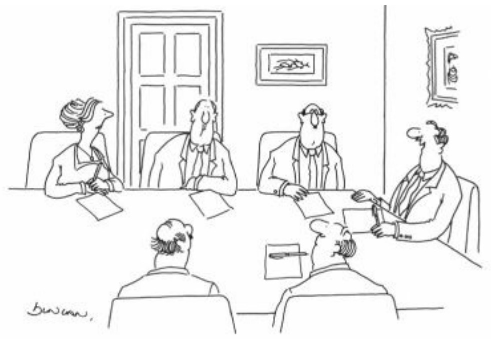
This illustrates the type of items found on a spatial abilities test. See answer below.[1]

Evolutionary psychologist Steven Pinker (2005) has argued that biology affects gender differences in life priorities (women’s somewhat greater interest in people versus men’s in money and things), in risk-taking (with men more reckless), and in math reasoning and spatial abilities. Such differences are, he noted, observed across cultures, stable over time, influenced by prenatal hormones, and observed in genetic boys raised as girls.

Maryam Mirzakhani/Getty Images

Minding the math gap In 2014, Iranian math professor Maryam Mirzakhani (1977–2017) became the first woman to win math’s most admired award, the Fields Medal. What was her advice to people who want to know more about math? Practice patience. “The beauty of mathematics,” Mirzakhani said, “only shows itself to more patient followers” (*The Guardian*, 2014).

But social influences also construct gender. Researchers report that culturally influenced preferences help explain why American women, more than men, avoid math-intensive vocations (Ceci & Williams, 2010, 2011). Social expectations and divergent opportunities also shape boys’ and girls’ interests and abilities (Crawford et al., 1995; Eccles et al., 1990). In Asia and Russia, teen girls have outperformed boys in an international science exam; in North America and Britain, boys have scored higher (Fairfield, 2012). More gender-equal cultures, such as Sweden and Iceland, exhibit little of the gender math gap found in gender-unequal cultures, such as Turkey and Korea (Guiso et al., 2008; Kane & Mertz, 2012). Since the 1970s, as gender equity has increased in the United States, the boy-to-girl ratio among 12- to 14-year-olds with very high SAT math scores (above 700) has declined from 13 to 1 to 3 to 1 (Nisbett et al., 2012). And in psychology, there’s been a dramatic change in the ratio of women to men earning doctorates—from 17 percent women in 1958 to 70 percent in 2015 (Burelli, 2008; NSF, 2016). Experience matters.



© Punch Limited

“That’s an excellent suggestion, Miss Triggs. Perhaps one of the men would like to suggest it.”

Racial and Ethnic Similarities and Differences

64-2 How and why do racial and ethnic groups differ in mental ability scores?

Fueling the group-differences debate are two other disturbing but scientifically agreed-upon facts:

- Racial and ethnic groups differ in their average intelligence test scores.
- High-scoring people (and groups) are more likely to attain high levels of education and income.

There are many group differences in average intelligence test scores. New Zealanders of European descent outscore native Maori New Zealanders. Israeli Jews outscore Israeli Arabs. Most Japanese outscore most Burakumin, a stigmatized Japanese minority. And White Americans have outscored Black Americans. This Black-White difference has diminished somewhat in recent years, especially among children (Dickens & Flynn, 2006; Nisbett et al., 2012). Such *group* differences provide little basis for judging individuals. Worldwide, women outlive men by four years, but knowing only that you are male or female won’t tell us how long you will live.

Larry Williams/Getty Images

We have seen that heredity contributes to *individual* differences in intelligence. But group differences in a heritable trait may be entirely environmental. Consider one of nature's experiments: Allow some children to grow up hearing their culture's dominant language, while others, born deaf, do not. Then give both groups an intelligence test rooted in the dominant language, and (no surprise) those with expertise in that language will score higher (Braden, 1994; Steele, 1990; Zeidner, 1990). Although individual performance differences may be substantially genetic, the group difference is not (**Figure 64.2**).

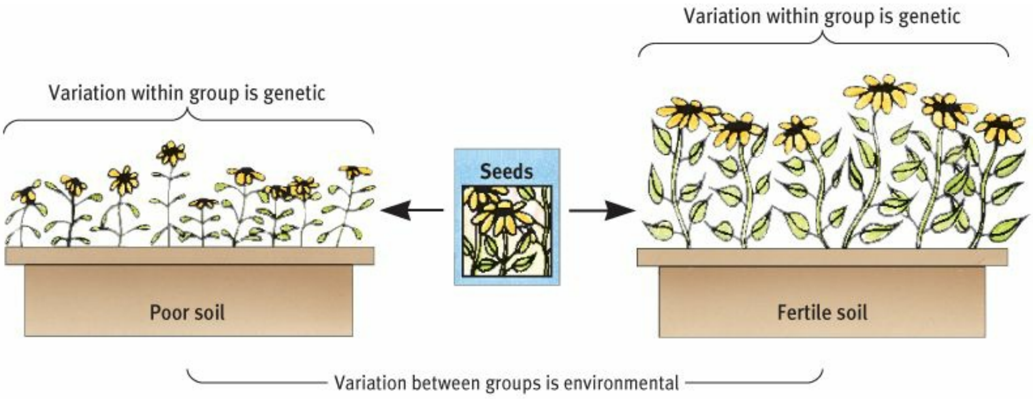

Variation within group is genetic
Variation within group is genetic
Seeds
Poor soil
Fertile soil
Variation between groups is environmental

Figure 64.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Information from Lewontin, 1976.

Figure 64.2 Group differences and environmental impact

Even if the variation between members within a group reflects genetic differences, the average difference between groups may be wholly due to environment. Imagine that seeds from the same mixture are sown in different soils. Although height differences *within* each window box of flowers will be genetic, the height difference *between* the two groups will be environmental.

Might the racial gap be similarly environmental? Consider:

Genetics research reveals that under the skin, we humans are remarkably alike. The average genetic difference between two Icelandic villagers or between two Kenyans greatly exceeds the group difference between Icelanders and Kenyans (Cavalli-Sforza et al., 1994; Rosenberg et al., 2002). Moreover, looks can deceive. Light-skinned Europeans and dark-skinned Africans are genetically closer than are dark-skinned Africans and dark-skinned Aboriginal Australians.

Race is not a neatly defined biological category. Many social scientists see race primarily as a social construction without well-defined physical boundaries, as each race blends seamlessly into the race of its geographical neighbors (Helms et al., 2005; Smedley & Smedley, 2005). In one genetic analysis of more than 160,000 people living in the United States, most with less than 28 percent African ancestry said they were White; those with more than 28 percent mostly said they were African-American (Byrc et al., 2015). Moreover, with increasingly mixed ancestries, more and more people defy neat racial categorization and self-identify as multiracial (Pauker et al., 2009).

The intelligence test performance of today's better-fed, better-educated, and more test-prepared population exceeds that of the 1930s population—by a greater margin than the intelligence test score of the average White today exceeding that of the average Black (Flynn, 2012; Pietschnig & Voracek, 2015; Trahan et al., 2014). One research review noted that the average intelligence test performance of today's sub-Saharan Africans is the same as that of British adults in 1948 (Wicherts et al., 2010). No one credits genetics for such generation-to-generation differences.

When Blacks and Whites have or receive the same pertinent knowledge, they exhibit similar information-processing skill. "The data support the view that cultural differences in the provision of information may account for racial differences in [intelligence test performance]," reported researchers Joseph Fagan and Cynthia Holland (2007a).

Schools and culture matter. Countries whose economies create a large wealth gap between rich and poor tend also to have a large rich-versus-poor intelligence test score gap (Nisbett, 2009). In China and Turkey, people in poorer regions have the lowest intelligence test scores, and those in wealthier regions have the highest (Lynn et al., 2015, 2016). Moreover, educational policies such as kindergarten attendance, school discipline, and instructional time per year predict national differences in intelligence and knowledge tests (Lynn & Vanhanen, 2012; Rindermann & Ceci, 2009). Math achievement, aptitude test differences, and especially grades may reflect conscientiousness more than competence (Poropat, 2014). Asian students, who have outperformed North American students on such tests, have also spent 30 percent more time in school and much more time in and out of school studying math (Geary et al., 1996; Larson & Verma, 1999; Stevenson, 1992). Women in college and university similarly outperform equally able men, thanks partly to their greater conscientiousness (Keiser et al., 2016).

In different eras, different ethnic groups have experienced golden ages —periods of remarkable achievement. Twenty-five hundred years ago, it was the Greeks and the Egyptians, then the Romans. In the eighth and ninth centuries, genius seemed to reside in the Arab world. Five hundred years ago, the Aztec Indians and the peoples of Northern Europe were the superachievers. Today, many people notice Asian technological genius and Jewish cultural success. Cultures rise and fall over centuries; genes do not. That fact makes it difficult to attribute a natural superiority to any racial or ethnic group.

TEAM NIGERIA
TEAM NIGERIA
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TEAM NIGERIA
NIGERIA SCRABBLE

PIUS UTOMI EKPEI/Getty Images

World Scrabble champs In 2015, Team Nigeria was the top country in the World Scrabble Championship. Five of its six members finished among the top

50 contestants, including Wellington Jighere, center, the individual world Scrabble champion.

Moreover, consider the striking results of studies that reveal a shrinking White/Black aptitude gap over time and with more equal education (Nisbett, 2009). One national study looked back over the mental test performances of White and Black young adults after graduation from college. From eighth grade through the early high school years, the average aptitude score of the White students increased, while that of the Black students decreased—creating a gap that reached its widest point at about the time that high school students like you take college admissions tests. But during college, the Black students' scores increased "more than four times as much" as those of their White counterparts, thus greatly decreasing the aptitude gap. "It is not surprising," concluded researcher Joel Myerson and his colleagues (1998), "that as Black and White students complete more grades in high school environments that differ in quality, the gap in cognitive test scores widens. At the college level, however, where Black and White students are exposed to educational environments of comparable quality . . . many Blacks are able to make remarkable gains, closing the gap in test scores."

The Question of Bias

64-3 Are intelligence tests inappropriately biased? How does stereotype threat affect test-takers’ performance?

If one assumes that *race* is a meaningful concept, the debate over racial differences in intelligence divides into three camps (Hunt & Carlson, 2007):

- There are genetically disposed racial differences in intelligence.
- There are socially influenced racial differences in intelligence.
- There are racial differences in test scores because the tests are inappropriate or biased.

We have considered group difference from the first and second perspectives. Let’s turn now to the third: Are intelligence tests biased? The answer depends on which of two very different definitions of bias we use.

Two Meanings of Bias

The *scientific* meaning of *bias* hinges on a test’s validity—on whether it predicts future behavior only for some groups of test-takers. For example, if the SAT accurately predicted the college achievement of women but not that of men, then the test would be biased. In this statistical meaning of the term, the near-consensus among psychologists (as summarized by the U.S. National Research Council’s Committee on Ability Testing and the American Psychological Association’s Task Force on Intelligence) has been that the major U.S. aptitude tests are *not* biased (Berry & Zhao, 2015; Neisser et al., 1996; Wigdor & Garner, 1982). The tests’ predictive validity is roughly the same for women and men, for various races, and for rich and poor. If an intelligence test score of 95 predicts slightly below-average grades, that rough prediction usually applies equally to all.

But we can also consider a test biased if it detects not only innate differences in intelligence but also performance differences caused by cultural experiences. This in fact happened to Eastern European immigrants in the early 1900s. Lacking the experience to answer questions about their new culture, many were classified as “feebleminded.” In this popular sense, intelligence tests are biased. They measure your developed abilities, which reflect, in part, your education and experiences.

You may have read examples of intelligence test items that make assumptions (for example, that a cup goes with a saucer). Such items bias the test (against those who do not use saucers). Could such questions explain cultural differences in test performance? In such cases, tests can be a vehicle for discrimination, consigning potentially capable children (some of whom may have a different native language) to unchallenging classes and dead-end jobs. Thus, some intelligence researchers recommend creating culture-neutral questions—such as assessing people’s ability to learn novel words, sayings, and analogies—to enable *culture-fair* aptitude tests (Fagan & Holland, 2007b, 2009).

Defenders of the existing aptitude tests have noted that racial group differences persist on nonverbal items, such as counting digits backward (Jensen, 1983, 1998). Moreover, they add, blaming the test for a group’s lower scores is like blaming a messenger for bad news. Why blame the tests for exposing unequal experiences and opportunities? If, because of malnutrition, people were to suffer stunted growth, would you blame the measuring stick that reveals it? If unequal past experiences predict unequal future achievements, a valid aptitude test will detect such inequalities.

So, test-makers’ expectations can introduce bias in an intelligence test. This is consistent with an observation we have seen throughout this text: Our expectations and attitudes can influence our perceptions and behaviors. This is also true for the person taking the test.

Test-Takers’ Expectations

When Steven Spencer and his colleagues (1997) gave a difficult math test to equally capable men and women, women did not do as well—except when they had been led to expect that women usually do as well as men on the test. Expecting to struggle with the math affected their performance. There was a “threat in the air” (Spencer et al., 2016). And with Claude

Steele and Joshua Aronson, Spencer (2002) again observed this self-fulfilling **stereotype threat** when Black students performed worse after being reminded of their race just before taking verbal aptitude tests. Follow-up experiments have confirmed that negatively stereotyped minorities and women may have unrealized academic and professional potential (Grand, 2016; Nguyen & Ryan, 2008; Walton & Spencer, 2009). If, when taking an intelligence test or performing a work-related task, you are worried that your group or "type" often doesn't do well, your self-doubts and self-monitoring may hijack your working memory and impair your performance (Hutchison et al., 2013). Such thoughts, and worries about what others are thinking about you, can be distracting. For such reasons, stereotype threat may impair attention, performance, and learning (Inzlicht & Kang, 2010; Rydell et al., 2010). Remove the threat—by labeling the assessment as a "warm-up" exercise rather than a "test"—and stereotyped minorities often perform better (Taylor & Walton, 2011).

stereotype threat

a self-confirming concern that one will be evaluated based on a negative stereotype.

Stereotype threat helps explain why Blacks have scored higher when tested by Blacks than when tested by Whites (Danso & Esses, 2001; Inzlicht & Ben-Zeev, 2000). It implies a possible effect of non-Black teachers having lower expectations for Black students than do Black teachers (Gershenson et al., 2016). And it gives us insight into why women have scored higher on math tests with no male test-takers present, and why women's online chess performance drops sharply when they *think* they are playing a male opponent (Maass et al., 2008).

> “ *Math class is tough!* ”
>
> *"Teen Talk" talking Barbie doll (introduced July 1992, recalled October 1992)*

Steele (1995, 2010) concludes that telling students they probably won’t succeed (as is sometimes implied by remedial “minority support” programs) functions as a stereotype that can erode performance. Over time, such students may detach their self-esteem from academics and look for recognition elsewhere. Indeed, as African-American male students progress from eighth to twelfth grade, a growing disconnect appears between their grades and their self-esteem, and they tend to underachieve (Osborne, 1997).

One experiment randomly assigned some African-American seventh graders to write for 15 minutes about their most important values (Cohen et al., 2006, 2009). That simple exercise in self-affirmation boosted their semester grades in two replications. Can a brief confidence-boosting exercise actually increase school achievement? “It was hard for us to believe,” reported Geoffrey Cohen (2013), “but we’ve replicated it [again] since,” including among women in college physics. Other research teams also have reproduced the benefits of the self-affirmation exercise (Bowen et al., 2013; Cohen & Sherman, 2014; Harackiewicz et al., 2014, 2016). When challenged to believe in their potential, increase their sense of belonging, or focus on intelligence as malleable (rather than fixed), disadvantaged university students have likewise earned markedly higher grades and have had lower dropout rates (Tibbetts et al., 2016; Yeager et al., 2016b).

> “*Almost all the joyful things of life are outside the measure of IQ tests.*”
>
> *Madeleine L’Engle, A Circle of Quiet, 1972*

* * *

What, then, can we realistically conclude about aptitude tests and bias? The tests are not biased in the scientific sense of failing to make valid statistical predictions for different groups. But they are indeed biased in one sense—sensitivity to performance differences caused by cultural experience. Are the tests discriminatory? Again, the answer can be *Yes* or *No*. In one sense, *Yes*, their purpose is to discriminate—to distinguish among individuals. In another sense, *No,* their purpose is to reduce discrimination by decreasing reliance on subjective criteria for school and job placement—who you know, what school you're from, or whether you are the "right kind of person." Civil service aptitude tests, for example, were devised to discriminate more fairly and objectively by reducing the political, racial, ethnic, and gender discrimination that preceded their use. Banning aptitude tests would lead those who decide on jobs and admissions to rely more on other considerations, such as personal opinion.

> “*[Einstein] showed that genius equals brains plus tenacity squared.*”
>
> *Walter Isaacson, "Einstein's Final Quest," 2009*

Perhaps, then, our goals for tests of mental abilities should be threefold. First, we should realize the benefits that intelligence testing pioneer Alfred Binet foresaw—to enable schools to recognize who might profit most from early intervention. Second, we must remain alert to Binet's fear that intelligence test scores may be misinterpreted as literal measures of a person's worth and potential. Third, we must remember that the competence that general intelligence tests sample is important; it helps enable success in some life paths. But it reflects only one aspect of personal competence (Stanovich et al., 2013; Stanovich & West, 2014a,b). Our rationality, practical intelligence, and emotional intelligence matter, too, as do other forms of creativity, talent, and character.

The point to remember: There are many ways of being successful; our differences are variations of human adaptability. Life's great achievements result not only from "can do" abilities (and fair opportunity) but also from "will do" motivation. Competence + Diligence → Accomplishment.

✓ Check Your Understanding

Ask Yourself

- How have your expectations influenced your own test performance? What steps could you take to control this influence?

Test Yourself

- What psychological principle helps explain why women tend to perform more poorly when they believe their online chess opponent is male?
- What is the difference between a test that is biased culturally, and a test that is biased in terms of its validity?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 64 REVIEW

64-1 How and why do the genders differ in mental ability scores?

- Males and females tend to have the same average intelligence test scores. They differ in some specific abilities.
- Girls are better spellers, more verbally fluent, better at locating objects, better at detecting emotions, and more sensitive to touch, taste, and color.
- Boys outperform girls at spatial ability and related mathematics, though boys and girls hardly differ in math computation. Boys also outnumber girls at the low and high extremes of mental abilities.
- Psychologists debate evolutionary, brain-based, and cultural explanations of such gender differences.

64-2 How and why do racial and ethnic groups differ in mental ability scores?

- Racial and ethnic groups differ in their average intelligence test scores.
- The evidence suggests that environmental differences are largely, perhaps entirely, responsible for these group differences.

64-3 Are intelligence tests inappropriately biased? How does stereotype threat affect test-takers' performance?

- Aptitude tests aim to predict how well a test-taker will perform in a given situation. So they are necessarily "biased" in the sense that they are sensitive to performance differences caused by cultural experience.
- By "inappropriately biased," psychologists mean that a test predicts less accurately for one group than for another. In this sense, most experts consider the major aptitude tests unbiased.
- *Stereotype threat*, a self-confirming concern that one will be evaluated

based on a negative stereotype, affects performance on all kinds of tests.

Multiple-Choice Questions

1. Which of the following is true of boys compared with girls?

a. Boys have a higher average intelligence score.
b. Boys are better spellers than girls.
c. Boys are better at detecting emotions.
d. Boys are more verbally fluent.
e. Boys are more likely to be represented among those scoring extremely low as well as those scoring extremely high on tests of mental abilities.

2. Which of the following provides the best evidence that race is more of a social construct than a biological category?

a. People of varying ancestry may categorize themselves as having the same race.
b. Scores on tests of mental abilities vary by race.
c. Behavior traits are associated with race.
d. Skin cancer rates vary by race.
e. The incidence of high blood pressure varies by race.

3. According to most experts, intelligence tests are not biased because

a. the average scores for various racial and ethnic groups do not differ by much.
b. the tests do a pretty good job of predicting what they are supposed to predict.
c. cultural background has little influence on test scores.
d. scores on the test are not very stable even when you don’t consider race.
e. scores are increasing for almost all groups because of the Flynn effect.

Practice FRQs

1. Luis is a Mexican-American high school student with a 3.8 GPA. He recently completed his SAT in a room with a White proctor and an all White group of students. His score was much lower than he predicted based on the practice exam he took during his English class at his largely Hispanic high school. Explain how each of the following may have contributed to his lower score:
    - Bias
    - Stereotype threat

Answer

1 point: Racial group differences do exist on some types of intelligence tests. If the questions on Luis' test were reflective of a type of vocabulary that Luis had not been exposed to, even if unintentional, then the test that he took was biased against him. Page 657

1 point: The stereotype threat would be something that Luis would impose on himself. If he had heard that Hispanic students generally do more poorly on the SAT than do White students, he may have looked around the room and felt pressure internally and not have done as well as he was capable of doing. Page 657

2. Explain three reasons why racial differences in intelligence might be caused by environmental factors.

(3 points)

UNIT XI REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

intelligence, p. 626

general intelligence (*g*), p. 626

factor analysis, p. 626

savant syndrome, p. 627

grit, p. 629

emotional intelligence, p. 629

intelligence test, p. 632

achievement test, p. 632

aptitude test, p. 632

mental age, p. 633

Stanford-Binet, p. 634

intelligence quotient (IQ), p. 634

Wechsler Adult Intelligence Scale (WAIS), p. 635

standardization, p. 635

normal curve, p. 635

reliability, p. 636

validity, p. 636

content validity, p. 637

predictive validity, p. 637

cohort, p. 640

crystallized intelligence, p. 640

fluid intelligence, p. 640

cross-sectional study, p. 640

longitudinal study, p. 640

intellectual disability, p. 644

Down syndrome, p. 644

heritability, p. 647

stereotype threat, p. 657

KEY CONTRIBUTORS TO REMEMBER

Charles Spearman, p. 626

L. L. Thurstone, p. 626

Howard Gardner, p. 627

Robert Sternberg, p. 628

Francis Galton, p. 633

Alfred Binet, p. 633

Lewis Terman, p. 634

David Wechsler, p. 635

Carol Dweck, p. 650

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. People are said to have an intellectual disability if they have difficulty adapting to the demands of independent living and have IQ scores below

a. 60.
b. 70.
c. 80.
d. 90.
e. 100.

2. Charles Spearman’s *g* refers to

a. general intelligence.
b. grouped intelligence factors.
c. genetic intelligence.
d. generated creativity.

e. generalized reliability.

3. Which of the following individuals would best represent our understanding of fluid versus crystallized intelligence?

a. James is 80 and has just solved a math equation that has been puzzling him for the last 40 years.
b. Luis is 22 and has written several successful novels.
c. Alice is 25 and has discovered a new chemical element.
d. As a high school student, Alex changed the way people thought about a local homeless man by doing research into his life.
e. After watching the sky for 50 years Nate finally discovered a new planet.

4. What would be true of a thermometer that always reads three degrees lower than the actual temperature?

a. It is valid but not reliable.
b. It is both reliable and valid.
c. It is neither reliable nor valid.
d. It is not valid, but you cannot determine if it is reliable from the information given.
e. It is reliable but not valid.

5. What is the benefit of standardizing an intelligence test?

a. To counter rising intelligence test scores
b. To measure the extent to which the test actually predicts what it promises
c. To provide a basis for comparing scores against a pretested group
d. To determine if the test yields dependably consistent results
e. To calculate the relative effects of nature and nurture on intelligence

6. Achievement tests are to aptitude tests as

a. verbal performance is to spatial performance.
b. elementary school skills are to secondary school skills.
c. measurement is to prediction.

d. reliability is to validity.
e. general intelligence is to multiple intelligences.

7. Howard Gardner found evidence of multiple intelligences in individuals who scored low on intelligence but had an area of exceptional ability—for example, to make complex calculations. These people have

a. the Flynn effect.
b. savant syndrome.
c. advanced mental age.
d. Wechsler syndrome.
e. intelligence heritability.

8. Which of the following is one of Robert Sternberg’s types of intelligence?

a. Naturalistic intelligence
b. General intelligence
c. Practical intelligence
d. Savant intelligence
e. Kinesthetic intelligence

9. Researchers studying the effects of genes on intelligence have found that

a. intelligence is affected by many genes working together.
b. there is a gene that is involved in the intelligence of men but not women.
c. there is a gene that is involved in the intelligence of women but not men.
d. a single gene is involved in the intelligence of both men and women.
e. there is no evidence that genes play a role in intelligence.

0. The Flynn effect refers to the

a. superiority of certain racial and ethnic groups on intelligence tests.
b. extreme scores (very high and very low scores) that are more

common for males than for females on math tests.
c. stereotype threat that might cause some Black students to underperform on standardized tests.
d. predictive ability of intelligence tests.
e. gradual increase in average intelligence score of the general population over the last several decades.

1. If Lanie is able to tell when her husband is upset by noticing subtle changes in his facial expressions, she might be said to have a high degree of

a. emotional intelligence.
b. naturalistic intelligence.
c. practical intelligence.
d. spatial intelligence.
e. adaptive intelligence.

2. Heritability of intelligence refers to

a. the extent to which a person’s intelligence is caused by genetics.
b. the effect of adoption on the intelligence of adopted children.
c. the amount of group variation in intelligence that can be attributed to genetics.
d. the extent to which the quality of schools and other environmental factors determine intelligence.
e. the correlation between intelligence test scores of identical twins.

3. The most widely used modern intelligence test was developed by

a. Alfred Binet.
b. Louis Terman.
c. Robert Sternberg.
d. David Wechsler.
e. Howard Gardner.

4. Students who do well on college entrance exams generally do well in their first year of college. This helps establish that these exams have

a. predictive validity.
b. split-half reliability.
c. content validity.
d. test-retest reliability.
e. standard validity.

5. The purpose of Alfred Binet's early intelligence test was to

a. predict how children would do in school.
b. identify differences among ethnic and racial groups.
c. help French graduates find the occupation in which they were most likely to succeed.
d. establish the scientific definition of intelligence.
e. facilitate "genetic breeding" experiments.

6. The original formula for a child's intelligence quotient compared a child's

a. aptitude to his or her school performance.
b. mental age to his or her chronological age.
c. intelligence to his or her siblings' intelligence.
d. intelligence to his or her parents' intelligence.
e. math intelligence to his or her verbal intelligence.

7. If the scores on an intelligence test form a normal curve with a standard deviation of 15,

a. the mean, median, and mode are 100.
b. 68 percent of scores are between 85 and 115.
c. 60 percent of test-takers earned at least a 100.
d. a and b only are true.
e. a, b, and c are true.

8. If approached on the street by a stranger and asked to make a guess about their IQ score, your best guess would be

a. 50.
b. 75.

c. 100.
d. 125.
e. 150.

Free-Response Questions

1. Shervin is a high school student who excels in academics and usually scores very high on academic standardized tests. His friend, Hany, struggles in his coursework and with standardized tests, but is a brilliant pianist and dancer.

For each of the following psychologists, briefly explain his theory and identify how that psychologist might describe Shervin's and Hany's intelligence.

- Howard Gardner
- Robert Sternberg
- Charles Spearman

Rubric for Free Response Question 1

1 point: Gardner believes there are eight relatively independent intelligences: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, intrapersonal, interpersonal, and naturalist. Gardner has also proposed a possible ninth, existential intelligence. Page 627

1 point: Gardner might describe Shervin as having high logical-mathematical and linguistic intelligence, and Hany as having high musical and bodily-kinesthetic intelligence. Page 627

1 point: Sternberg's triarchic theory proposes three intelligences: creative, analytical, and practical. Page 628

1 point: Sternberg might predict that Shervin would score high in analytical intelligence and Hany would score high in creative intelligence. Page 628

1 point: According to Spearman's general intelligence theory, each individual has a general, underlying mental ability that is represented in all intelligent behavior. For example, if an individual is above average in verbal intelligence, then she will most likely be at least average, if not above average in spatial or reasoning ability as well. Page 626

1 point: Spearman might have predicted that Shervin would have a high general intelligence, and Hany would not, because Spearman would not have included creativity in music and dance in tests of general intelligence. Page 626

2. The principal of a new elementary school wants to give an IQ test to all students when they enter the school. The students will then be placed in groups of students with similar IQ scores. The principal assures the community that this plan is supported by scientific research and will improve education for all students, regardless of their ability.

- Using evidence, present an argument for or against intelligence testing for children early in life.
- Using evidence, present an argument for or against schools that "track" children based on intelligence test scores, separating high scorers from those with lower scores.
- Using evidence, present an argument supporting the claim that environmental influences affect intelligence.
- Using evidence, present an argument supporting the claim that labeling or tracking students could lead to stereotype threat.

(4 points)

3. Professor Emic wants to first develop an intelligence test that can be used cross-culturally, and then to assess the reliability and validity of that test.

Briefly explain how Professor Emic could examine the following characteristics about this new intelligence test:

- Standardization
- Reliability
- Validity
- Bias

(4 points)

UNIT XII Abnormal Behavior

JGI/Tom Grill/Getty Images

MODULES

65 Introduction to Psychological Disorders

66 Anxiety Disorders, Obsessive-Compulsive Disorder, and Posttraumatic Stress Disorder

67 Depressive Disorders, Bipolar Disorder, Suicide, and Self-Injury

68 Schizophrenia

69 Other Disorders

I felt the need to clean my room at home in Indianapolis every

> Sunday and would spend four to five hours at it. I would take every book out of the bookcase, dust and put it back. At the time I loved doing it. Then I didn't want to do it anymore, but I couldn't stop. The clothes in my closet hung exactly two fingers apart. . . . I made a ritual of touching the wall in my bedroom before I went out because something bad would happen if I didn't do it the right way. I had a constant anxiety about it as a kid, and it made me think for the first time that I might be nuts.
>
> *Marc, diagnosed with obsessive-compulsive disorder (from Summers, 1996)*

> Whenever I get depressed it's because I've lost a sense of self. I can't find reasons to like myself. I think I'm ugly. I think no one likes me. . . . I become grumpy and short-tempered. Nobody wants to be around me. I'm left alone. Being alone confirms that I am ugly and not worth being with. I think I'm responsible for everything that goes wrong.
>
> *Greta, diagnosed with depression (from Thorne, 1993, p. 21)*

> Voices, like the roar of a crowd, came. I felt like Jesus; I was being crucified. It was dark. I just continued to huddle under the blanket, feeling weak, laid bare and defenseless in a cruel world I could no longer understand.
>
> *Stuart, diagnosed with schizophrenia (from Emmons et al., 1997)*

Now and then, all of us feel, think, or act in ways that may resemble a psychological disorder. We feel anxious, depressed, withdrawn, or suspicious. So it's no wonder that we are drawn to try to understand disturbed psychological states—we sometimes see ourselves in the mental illnesses we study. "To study the abnormal is the best way of understanding the normal," said William James *(1842–1910)*.

Personally or through friends or family, we may experience the bewilderment and pain of unexplained physical symptoms, irrational fears, or a feeling that life is not worth living. Among American college students, 1 in 3 report an apparent mental health problem (Eisenberg et al., 2011).

Worldwide, more than half a billion people live with mental or behavior disorders (WHO, 2017a). Although their rates and symptoms vary by culture, no known society is free of two terrible disorders—major depressive disorder and schizophrenia (Baumeister & Härter, 2007; Draguns, 1990a,b, 1997). This unit examines these and other disorders. Unit XIII considers their *treatment.*

▶ **Unit XII Overview Video**

Module **65 Introduction to Psychological Disorders**

LEARNING TARGETS

- **65-1 Explain how we draw the line between normality and disorder.**
- **65-2 Contrast how the medical model and the biopsychosocial approach influence our understanding of psychological disorders.**
- **65-3 Describe how and why clinicians classify psychological disorders, and explain why some psychologists criticize the use of diagnostic labels.**
- **65-4 Discuss the controversy over attention-deficit/hyperactivity disorder.**
- **65-5 Examine whether psychological disorders predict violent behavior.**
- **65-6 Describe how many people have, or have had, a psychological disorder, and explore whether poverty is a potential risk factor.**

Introduction to Psychological Disorders

Most people would agree that someone who is depressed and stays mostly in bed for three months has a psychological disorder. But what about a grieving father who can’t resume his usual social activities three months after his child has died? Where should we draw the line between sadness and depression? Between a fear and a phobia? Between normality and abnormality? Let’s start with these questions:

- How should we *define* psychological disorders?
- How should we *understand* disorders? How do underlying biological factors contribute to disorder? How do troubling environments influence our well-being? And how do these effects of nature and nurture interact?
- How should we *classify* psychological disorders? And can we do so in a way that allows us to help people without stigmatizing or labeling them?
- What do we know about *rates* of psychological disorders? How many people have them? Who is vulnerable, and when?

Defining Psychological Disorders

65-1 How do we draw the line between normality and disorder?

A **psychological disorder** is a syndrome (collection of symptoms) marked by a "clinically significant disturbance in an individual's cognition, emotion regulation, or behavior" (American Psychiatric Association, 2013). Such thoughts, emotions, or behaviors are *dysfunctional* or *maladaptive*—they interfere with normal day-to-day life. Believing your home must be thoroughly cleaned every weekend is not a disorder. But if cleaning rituals interfere with work and leisure, as Marc's uncontrollable rituals did, they may be signs of a disorder. Occasional sad moods that persist and become disabling may likewise signal a psychological disorder.

psychological disorder

a syndrome marked by a clinically significant disturbance in an individual's cognition, emotion regulation, or behavior.

Distress often accompanies such dysfunction. Marc, Greta, and Stuart were all distressed by their thoughts, emotions, or behaviors.

I'm
Falling 4
U.
PROM?

Left: Carol Beckwith; Right: Francois Dubourdeau/Skydive East Tennessee

Culture and normality Young men of the West African Wodaabe tribe traditionally put on decorative makeup and costumes to attract women. Young American men may plan elaborate invitations for big events, as did this student (right) who appealed (successfully) to his date for prom. Each culture may view the other's behavior as abnormal.

Over time, definitions of what makes for a “significant disturbance” have varied. From 1952 through December 9, 1973, homosexuality was classified as a psychological disorder. By day’s end on December 10, it was not. The American Psychiatric Association made this change because more and more of its members no longer viewed same-sex attraction as a psychological problem. Such is the power of shifting societal beliefs. (Later research revealed, however, that the *stigma and stresses* that people who are gay, lesbian, transgender, and gender nonconforming often experience can increase the risk of mental health problems [Hatzenbuehler et al., 2009; Meyer, 2003].) In the twenty-first century, other controversies swirl over new or altered diagnoses in the most recent classification tool for describing disorders.

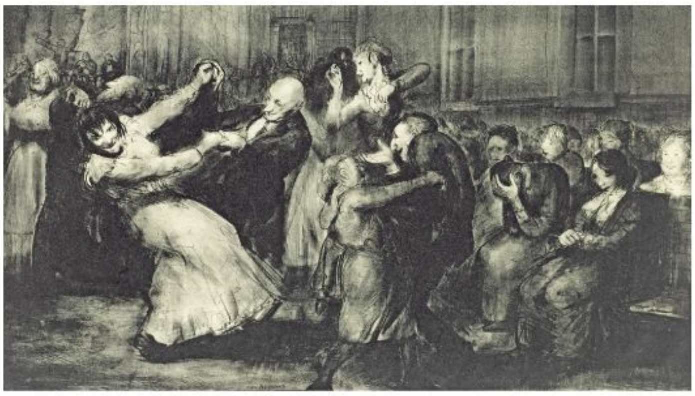
> “*Who in the rainbow can draw the line where the violet tint ends and the orange tint begins? Distinctly we see the difference of the colors, but where exactly does the one first blendingly enter into the other? So with sanity and insanity.*”
>
> *Herman Melville*, Billy Budd, Sailor, *1924*

Understanding Psychological Disorders

65-2 How do the medical model and the biopsychosocial approach influence our understanding of psychological disorders?

The way we view a problem influences how we try to solve it. In earlier times, people often viewed strange behaviors as evidence of strange forces—the movements of the stars, godlike powers, or evil spirits—at work. Had you lived during the Middle Ages, you might have said "The devil made him do it." Believing that, you might have approved of a harsh cure that would drive out the evil demon. Thus, people considered "mad" were sometimes caged or given "therapies" such as genital mutilation, beatings, removal of teeth or lengths of intestines, or transfusions of animal blood (Farina, 1982).

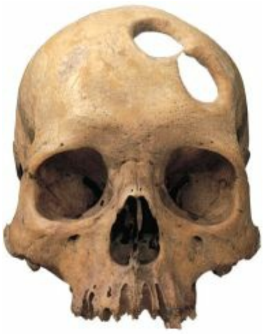
Reformers such as Philippe Pinel (1745–1826) in France opposed such brutal treatments. Madness is not demonic possession, he insisted, but a sickness of the mind caused by severe stress and inhumane conditions. Curing the illness, he said, requires *moral treatment*, including boosting patients' spirits by unchaining them and talking with them. He and others worked to replace brutality with gentleness, isolation with activity, and filth with clean air and sunshine.



Dance in a Madhouse, 1917 (litho)/Bellows, George Wesley (1882–1925) /SAN DIEGO MUSEUM OF ART/San Diego Museum of Art, USA/Bridgeman Images

"Moral treatment" Under Philippe Pinel's influence, hospitals sometimes sponsored patient dances, often called "lunatic balls," as depicted in this painting by George Bellows (Dance in a Madhouse).

In some places, cruel treatments for mental illness—including chaining people to beds or confining them in spaces with wild animals—linger even today. The World Health Organization has launched a reform that aims to transform hospitals worldwide “into patient-friendly and humane places with minimum restraints” (WHO, 2014a).


John W. Verano

Yesterday’s “therapy” Through the ages, psychologically disordered people have received brutal treatments, including the trephination evident in this Stone Age patient’s skull. Drilling skull holes like these may have been an attempt to release evil spirits and cure those with mental disorders. Did this patient survive the “cure”?

The Medical Model

By the 1800s, a medical breakthrough prompted further reforms. Researchers discovered that syphilis infects the brain and distorts the mind. This discovery triggered an eager search for physical causes of other mental disorders and for treatments that would cure them. Hospitals replaced asylums, and the **medical model** of mental disorders was born. This model is reflected in the terms we still use today. We speak of the mental *health* movement: A mental *illness* (also called a psycho*pathology*) needs to be *diagnosed* on the basis of its *symptoms*. It needs to be *treated* through *therapy*, which may include time in a psychiatric *hospital*.

medical model

the concept that diseases, in this case psychological disorders, have physical causes that can be *diagnosed, treated*, and, in most cases, *cured*, often through treatment in a *hospital*.

The medical perspective has been energized by more recent discoveries that genetically influenced abnormalities in brain structure and biochemistry contribute to many disorders (Insel & Cuthbert, 2015). A growing number of clinical psychologists now work in medical hospitals, where they collaborate with physicians to determine how the mind and body operate together.

FYI

Mental disorders due to a medical condition have also been called *organic disorders*.

The Biopsychosocial Approach

To call psychological disorders "sicknesses" tilts research heavily toward the influence of biology and away from the influence of our personal histories and social and cultural surroundings. But in the study of disorders, as in so many other areas, biological, psychological, and social-cultural influences together weave the fabric of our behaviors, our thoughts, and our feelings. As individuals, we differ in the amount of stress we experience and in the ways we cope with stressors. Cultures also differ in their sources of stress and in their traditional ways of coping. We are physically embodied and socially embedded.

Two disorders—major depressive disorder and schizophrenia—occur worldwide. From Asia to Africa and across the Americas, schizophrenia's symptoms often include irrationality and incoherent speech. Other disorders tend to be associated with specific cultures. Latin America lays claim to *susto*, a condition marked by severe anxiety, restlessness, and a fear of black magic. In Japanese culture, people may experience *taijin-kyofusho*—social anxiety about their appearance, combined with a readiness to blush and a fear of eye contact. The eating disorders anorexia nervosa and bulimia nervosa occur mostly in food-abundant Western cultures. Such disorders may share an underlying dynamic (such as anxiety) while differing in the symptoms (an eating problem or a type of fear) manifested in a particular culture. Even disordered aggression may have varying explanations in different cultures. In Malaysia, *amok* describes a sudden outburst of violent behavior (as in the English phrase “run amok”).

FYI

Increasingly, North American disorders, such as eating disorders, have spread across the globe (Watters, 2010).

Disorders reflect genetic predispositions and physiological states, inner psychological dynamics, and social and cultural circumstances. The biopsychosocial approach emphasizes that mind and body are inseparable (**Figure 65.1**). Negative emotions can contribute to physical illness, and physical abnormalities can likewise contribute to negative emotions. The biopsychosocial approach gave rise to the *stress vulnerability model (*also called the *diathesis-stress model*). This model suggests that individual characteristics combine with environmental stressors to increase or decrease the likelihood of developing a psychological disorder (Monroe & Simons, 1991; Zuckerman, 1999). Research on **epigenetics** (literally, “in addition to genetic”) supports the vulnerability-stress model by showing how our DNA and our environment interact. In one environment, a gene will be *expressed*, but in another, it may lie dormant. For some, that will be the difference between developing a disorder or not developing it.

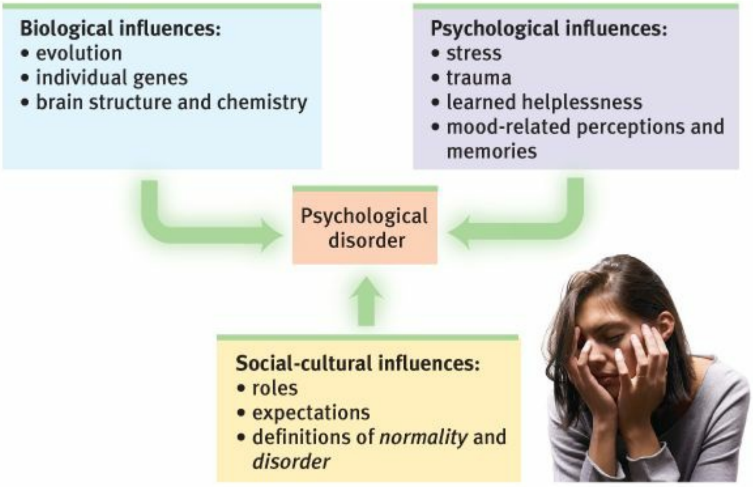

Biological influences:
• evolution
• individual genes
• brain structure and chemistry
Psychological influences:
• stress
• trauma
• learned helplessness
• mood-related perceptions and memories
Psychological disorder
Social-cultural influences:
• roles
• expectations
• definitions of *normality* and *disorder*

Figure 65.1
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Photo: Ghislain & Marie David de Lossy/Getty Images

Figure 65.1 The biopsychosocial approach to psychological disorders

Today's psychology studies how biological, psychological, and social-cultural factors interact to produce specific psychological disorders.

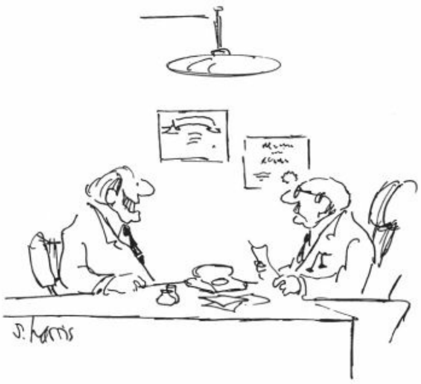
epigenetics

the study of environmental influences on gene expression that occur without a DNA change.

Classifying Disorders—and Labeling People

65-3 How and why do clinicians classify psychological disorders, and why do some psychologists criticize the use of diagnostic labels?

In biology, classification creates order. To classify an animal as a "mammal" says a great deal—that it is warm-blooded, has hair or fur, and produces milk to nourish its young. In psychiatry and psychology, too, classification orders and describes symptoms. To classify a person's disorder as "schizophrenia" suggests that the person talks incoherently, has bizarre beliefs, shows either little emotion or inappropriate emotion, or is socially withdrawn. "Schizophrenia" is a quick way to describe a complex disorder.



Sidney Harris

"I'm always like this, and my family was wondering if you could prescribe a mild depressant."

But diagnostic classification gives more than a thumbnail sketch of a person's disordered behavior, thoughts, or feelings. In psychiatry and psychology, classification also aims to *predict* a disorder's future course, *suggest* appropriate treatment, and *prompt research* into its causes. To study a disorder, we must first name and describe it.

In the United States, the most common tool for describing disorders and estimating how often they occur is the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders,* now in its fifth edition (**DSM-5**).[1] Physicians and mental health workers use the detailed “diagnostic criteria and codes” in the DSM-5 to guide medical diagnoses and treatment. For example, a person may be diagnosed with and treated for insomnia disorder if he or she meets all of the criteria in **Table 65.1**. The DSM-5’s diagnostic criteria and codes closely resemble those in the World Health Organization’s *International Classification of Diseases* (ICD), making it easy to track worldwide trends in psychological disorders.

DSM-5
the American Psychiatric Association’s *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition; a widely used system for classifying psychological disorders.

TABLE 65.1 Insomnia Disorder

• Feeling unsatisfied with amount or quality of sleep (trouble falling asleep, staying asleep, or returning to sleep)
• Sleep disruption causes distress or diminished everyday functioning
• Happens three or more nights each week
• Occurs during at least three consecutive months
• Happens even with sufficient sleep opportunities
• Independent from other sleep disorders (such as narcolepsy)
• Independent from substance use or abuse
• Independent from other mental disorders or medical conditions

Source: American Psychiatric Association, 2013.

In the new DSM-5, some diagnostic labels have changed. The conditions formerly called “autism” and “Asperger’s syndrome” were combined under the label *autism spectrum disorder*. “Mental retardation” became *intellectual disability*. New disorders, such as *hoarding disorder* and *binge-eating disorder*, were added.

Some of the new or altered diagnoses are controversial. *Disruptive mood dysregulation disorder* is a new DSM-5 diagnosis for children "who exhibit persistent irritability and frequent episodes of behavior outbursts three or more times a week for more than a year." Will this diagnosis assist parents who struggle with unstable children, or will it "turn temper tantrums into a mental disorder" and lead to overmedication, as the chair of the previous DSM edition warned (Frances, 2012)?

In real-world tests (*field trials)* assessing the reliability of the new DSM-5 categories, some diagnoses have fared well and others have fared poorly (Freedman et al., 2013). Clinician agreement on *adult posttraumatic stress disorder* and *childhood autism spectrum disorder,* for example, was near 70 percent. (If one psychiatrist or psychologist diagnosed someone with one of these disorders, there was a 70 percent chance that another mental health worker would independently give the same diagnosis.) But for *antisocial personality disorder* and *generalized anxiety disorder,* agreement was closer to 20 percent.

Critics have long faulted the DSM for casting too wide a net and bringing "almost any kind of behavior within the compass of psychiatry" (Eysenck et al., 1983). Some now worry that the DSM-5's even wider net will extend the pathologizing of everyday life. For example, the DSM has broadened the diagnostic criteria for **attention-deficit/hyperactivity disorder (ADHD)**. For those who experience these challenging symptoms, diagnosis and treatment can be a relief and bring improved functioning (Kupfer, 2012; Maciejewski et al., 2016). However, critics suggest that the criteria are now too broad and may turn normal, childish rambunctiousness into a disorder (Frances, 2013, 2014). (See Thinking Critically About: ADHD—Normal High Energy or Disordered Behavior?) The DSM also now classifies severe grief following the death of a loved one as a possible *depressive disorder*. Critics suggest that such grief could instead simply be considered a "normal" reaction to tragic life events.

attention-deficit/hyperactivity disorder (ADHD)

a psychological disorder marked by extreme inattention and/or hyperactivity and impulsivity.

Seeking a new but complementary approach to classification, the U.S. National Institute of Mental Health has established the Research Domain Criteria (RDoC) project (Insel et al., 2010; NIMH, 2017). The RDoC aims to bring “the power of modern research approaches in genetics, neuroscience, and behavioral science” to the study of psychological disorders (Insel & Lieberman, 2013). This framework helps organize disorders according to behaviors and brain activity related to negative or positive emotions, cognition, social relationships, and arousal and sleep. Exploring these dimensions improves psychologists’ ability to classify and treat disorders.

Other critics of classification register a more basic complaint—that diagnostic labels can be subjective, or even value judgments masquerading as science. Once we label a person, we view that person differently (Bathje & Pryor, 2011; Farina, 1982; Sadler et al., 2012). Labels can change reality by putting us on alert for evidence that confirms our view. If we hear that a new co-worker is a nasty person, we may treat her suspiciously, leading her to respond as a mean-spirited person would. Teachers who were told certain students were “gifted” then acted in ways that elicited the behaviors they expected (Snyder, 1984). Labels can be self-fulfilling.

The biasing power of labels was clear in a classic and controversial study. David Rosenhan (1973) and seven others went to hospital admissions offices, complaining (falsely) of “hearing voices” saying *empty, hollow,* and *thud.* Apart from this complaint and giving false names and occupations, they answered questions truthfully. All eight healthy people were misdiagnosed with disorders.

Should we be surprised? Surely not. As one psychiatrist noted, if someone swallows blood, goes to an emergency room, and spits it up, we wouldn’t fault the doctor for diagnosing a bleeding ulcer. But what followed the diagnoses was startling. Until being released an average of 19 days later, those eight “patients” showed no other symptoms. Yet after analyzing their (quite normal) life histories, clinicians were able to "discover" the causes of their disorders, such as having mixed emotions about a parent. Even routine note-taking behavior was misinterpreted as a symptom.

DEMOCRAT
Martin J.
WALSH
FOR MAYOR
www.MartyWalsh.org

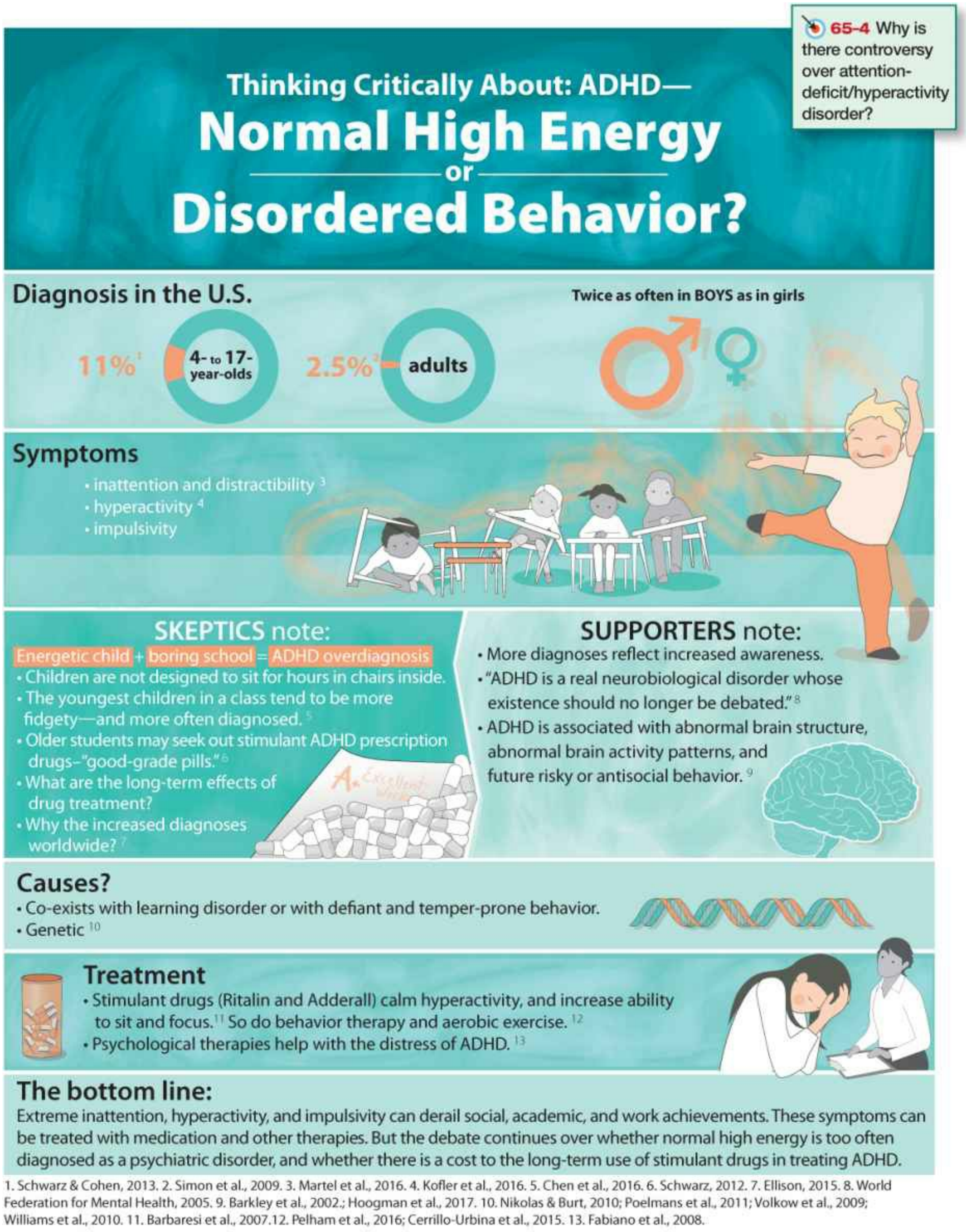
GRETCHEN ERTL/The New York Times/Redux Pictures

Struggles and recovery During his campaign, Boston Mayor Martin Walsh spoke openly about his past struggles with alcohol. His story of recovery helped him win in 2014—the closest Boston mayoral election in decades.

Labels matter. In another study, people watched recorded interviews. If told the interviewees were job applicants, the viewers perceived them as normal (Langer & Abelson, 1974; Langer & Imber, 1980). Other viewers who were told they were watching cancer or psychiatric patients perceived the same interviewees as "different from most people." Therapists who thought they were watching an interview of a psychiatric patient perceived him as "frightened of his own aggressive impulses," a "passive, dependent type," and so forth. A label can, as Rosenhan discovered, have "a life and an influence of its own."

Labels also have power in everyday life. Getting a job or finding a place to rent can be a challenge for people recently released from a psychiatric hospital. Label someone as "mentally ill" and people may fear them as potentially violent. That reaction may fade as people better understand that many psychological disorders involve diseases of the brain, not failures of character. Public figures have helped foster this understanding by speaking openly about their own struggles with disorders such as depression and substance abuse. The more contact we have with people with disorders, the more accepting our attitudes become (Corrigan et al., 2014).

65-4 Why is there controversy over attention-deficit/hyperactivity disorder?



Thinking Critically About: ADHD—

Normal High Energy or Disordered Behavior?

Diagnosis in the U.S.

11%[1] 4- to 17-year-olds

2.5%[2] adults

Twice as often in BOYS as in girls

Symptoms

- inattention and distractibility [3]
- hyperactivity [4]
- impulsivity

SKEPTICS note:

Energetic child + boring school = ADHD overdiagnosis

- Children are not designed to sit for hours in chairs inside.
- The youngest children in a class tend to be more fidgety—and more often diagnosed. [5]
- Older students may seek out stimulant ADHD prescription drugs–"good-grade pills." [6]
- What are the long-term effects of drug treatment?
- Why the increased diagnoses worldwide? [7]

SUPPORTERS note:

- More diagnoses reflect increased awareness.
- "ADHD is a real neurobiological disorder whose existence should no longer be debated." [8]
- ADHD is associated with abnormal brain structure, abnormal brain activity patterns, and future risky or antisocial behavior. [9]

Causes?

- Co-exists with learning disorder or with defiant and temper-prone behavior.
- Genetic [10]

Treatment

- Stimulant drugs (Ritalin and Adderall) calm hyperactivity, and increase ability to sit and focus.[11] So do behavior therapy and aerobic exercise. [12]
- Psychological therapies help with the distress of ADHD. [13]

The bottom line:

Extreme inattention, hyperactivity, and impulsivity can derail social, academic, and work achievements. These symptoms can be treated with medication and other therapies. But the debate continues over whether normal high energy is too often diagnosed as a psychiatric disorder, and whether there is a cost to the long-term use of stimulant drugs in treating ADHD.

1. Schwarz & Cohen, 2013. 2. Simon et al., 2009. 3. Martel et al., 2016. 4. Kofler et al., 2016. 5. Chen et al., 2016. 6. Schwarz, 2012. 7. Ellison, 2015. 8. World Federation for Mental Health, 2005. 9. Barkley et al., 2002.; Hoogman et al., 2017. 10. Nikolas & Burt, 2010; Poelmans et al., 2011; Volkow et al., 2009; Williams et al., 2010. 11. Barbaresi et al., 2007.12. Pelham et al., 2016; Cerrillo-Urbina et al., 2015. 13. Fabiano et al., 2008.

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Despite their risks, diagnostic labels have benefits. They help mental health professionals to communicate about their cases and to study the causes and treatments of disorders. Clients are often relieved to learn that their suffering has a name, and that they are not alone in experiencing their symptoms.

> “*My sister suffers from a bipolar disorder and my nephew from schizoaffective disorder. There has, in fact, been a lot of depression and alcoholism in my family and, traditionally, no one ever spoke about it. It just wasn’t done. The stigma is toxic.*”
>
> *Actress Glenn Close, “Mental Illness: The Stigma of Silence,” 2009*

Paramount Pictures/Photofest

Better portrayals Old stereotypes are slowly being replaced in media portrayals of psychological disorders. Recent films offer fairly realistic depictions. *Iron Man 3* (2013) portrayed a main character, shown here, with posttraumatic stress disorder.

✓ Check Your Understanding

Ask Yourself

- Do you know someone (could be you) who has been diagnosed with a psychological disorder? How do you think a diagnostic label might help or hurt this person?

Test Yourself

- A lawyer is distressed by feeling the need to wash his hands 100 times a day. He has little time to meet with clients, and his colleagues are wondering about his competence. His behavior would probably be labeled disordered, because it is _______________—that is, it interferes with his day-to-day life.
- Are psychological disorders universal or culture-specific? Explain with examples.
- What is the value, and what are the dangers, of labeling individuals with

disorders?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Does Disorder Equal Danger?

65-5 Do psychological disorders predict violent behavior?

September 16, 2013, started like any other Monday at Washington, DC's, Navy Yard, with people arriving early to begin work. Then government contractor Aaron Alexis entered the building and began shooting. An hour later, 13 people were dead, including the shooter. Reports later confirmed that Alexis had a history of mental illness and had stated that an "ultra low frequency attack is what I've been subject to for the last three months. And to be perfectly honest, that is what has driven me to this." This devastating mass shooting, like the one in a Connecticut elementary school in 2012 and many others since then, reinforced public perceptions that people with psychological disorders pose a threat (Barry et al., 2013; Jorm et al., 2012). "People with mental illness are getting guns and committing these mass shootings," said Speaker of the U.S. House Paul Ryan (2015). In one survey, 84 percent of Americans agreed that "increased government spending on mental health screening and treatment" would be a "somewhat" or "very" effective "approach to preventing mass shootings at schools" (Newport, 2012).

NEWTOWN
REMEMBERS
OUR HEROES
CHARLOTTE
DANIEL
JAMES
GRACE
EMILIE
JACK
NOAH
CAROLINE
JESSICA
AVIELLE
BENJAMIN

ADREES LATIF/REUTERS/Newscom

How to prevent mass shootings? Following the Newtown, Connecticut, slaughter of 20 young children and 6 adults, people wondered: Could those at risk for violence be identified in advance by mental health workers and reported to police? Would laws that require such reporting discourage disturbed gun owners from seeking mental health treatment?

Do disorders actually increase risk of violence? And can clinicians predict who is likely to do harm? *No*. Most violent criminals are not mentally ill, and most mentally ill people are not violent (Fazel & Grann, 2006; Skeem et al., 2016). Moreover, clinical prediction of violence is unreliable. The few people with disorders who commit violent acts tend to be either those, like the Navy Yard shooter, who experience threatening delusions and hallucinated voices that command them to act, who have suffered a financial crisis or lost relationship, or who abuse substances (Douglas et al., 2009; Elbogen et al., 2016; Fazel et al., 2009, 2010).

People with disorders are more likely to be *victims* than perpetrators of violence (Marley & Bulia, 2001). According to the U.S. Surgeon General's Office (1999, p. 7), "there is very little risk of violence or harm to a stranger from casual contact with an individual who has a mental disorder." Psychological disorders only rarely lead to violent acts, and focusing gun restrictions only on mentally ill people will likely not reduce gun violence (Friedman, 2012). Better predictors of violence are use of alcohol or drugs, previous violence, and gun availability. The mass-killing shooters have one more thing in common: They tend to be young males.

Whether people with mental disorders who turn violent should be held responsible for their behavior remains controversial. U.S. President Ronald Reagan's near-assassin, John Hinckley, was sent to a hospital rather than to prison. The public was outraged. Others were outraged in 2011, when Jared Lee Loughner killed six people and injured several others, including U.S. Representative Gabrielle Giffords. Loughner was diagnosed with schizophrenia but nevertheless sentenced to life in prison without parole.

AP® EXAM TIP

Notice that the term *insanity* comes out of the legal system. Insanity in criminal law means that defendants cannot be held accountable for their actions, typically due to mental disorder. It is not a psychological or medical diagnosis and does not appear in the DSM-5.

Which decision—hospital or prison—was correct? “My brain . . . my genes . . . my bad upbringing made me do it.” Such defenses were anticipated by Shakespeare’s Hamlet. If I wrong someone when not myself, he explained, “then Hamlet does it not, Hamlet denies it. Who does it then? His madness.” Such is the essence of a legal insanity defense, which asserts that the defendant cannot be held responsible for a criminal act. “Insanity” is a legal rather than a psychological concept, created in 1843 after a deluded Scotsman tried to shoot the prime minister (who he thought was persecuting him) but killed an assistant by mistake. Like Hinckley, Daniel M’Naghten was sent to a mental hospital rather than to prison. In both cases, the public was outraged. “Hinckley Insane, Public Mad,” declared one headline.

As we come to better understand the biological and environmental bases for all human behavior, from generosity to murder, when should we hold people accountable (or not) for their actions? In these situations, psychology and the legal system often work together. Mental health practitioners may be asked to interview and assess offenders and provide their expert opinions, or to discuss an existing client, which may be done only with the client’s approval. (When a person sees a therapist, confidentiality about those sessions is generally assured by the strict rules of the *therapist-patient privilege*.) With this information in hand, judges and juries can make more informed decisions about personal responsibility and accountability.

Rates of Psychological Disorders

65-6 How many people have, or have had, a psychological disorder? Is poverty a risk factor?

Who is most vulnerable to psychological disorders? At what times of life? To answer such questions, many countries have conducted lengthy structured interviews with representative samples of thousands of their citizens. After asking hundreds of questions that probed for symptoms —"Has there ever been a period of two weeks or more when you felt like you wanted to die?"—the researchers have estimated the current, prior-year, and lifetime prevalence of various disorders.

How many people have, or have had, a psychological disorder? More than most of us suppose:

- The U.S. National Institute of Mental Health (2015) has estimated that just under 1 in 5 adult Americans currently have a "mental, behavioral, or emotional disorder (excluding developmental and substance use disorders)" or have had one within the past year (**Table 65.2**).
- A World Health Organization study—based on 90-minute interviews with thousands of people who were representative of their country's population—estimated the number of prior-year mental disorders in 28 countries (Kessler et al., 2009). As **Figure 65.2** illustrates, the lowest rate of reported mental disorders was in Nigeria, the highest rate in the United States. Moreover, immigrants to the United States from Mexico, Africa, and Asia averaged better mental health than their U.S. counterparts with the same ethnic heritage (Breslau et al., 2007; Maldonado-Molina et al., 2011). For example, compared with Mexican-Americans born in the United States, Mexican-Americans who have recently immigrated are less at risk for mental disorders—a phenomenon known as the *immigrant paradox* (Schwartz et al., 2010).

TABLE 65.2 Percentage of Americans Reporting Selected Psychological Disorders in the Past Year

Psychological Disorder	**Percentage**
Depressive disorders or bipolar disorder	9.3
Phobia of specific object or situation	8.7
Social anxiety disorder	6.8
Attention-deficit/hyperactivity disorder (ADHD)	4.1
Posttraumatic stress disorder (PTSD)	3.5
Generalized anxiety disorder	3.1
Schizophrenia	1.1
Obsessive-compulsive disorder	1.0

Data from: National Institute of Mental Health, 2015.

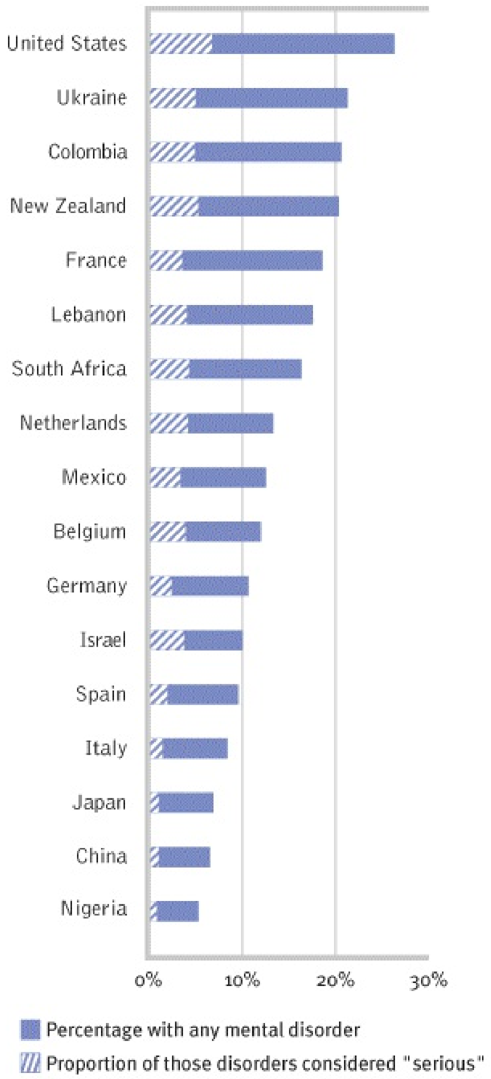

Figure 65.2
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Figure 65.2 Prior-year prevalence of disorders in selected areas

From interviews in 28 countries (Kessler et al., 2009).

What increases vulnerability to mental disorders? As **Table 65.3** indicates, there is a wide range of risk and protective factors for mental disorders. But one predictor of mental disorder—poverty—crosses ethnic and gender lines. The incidence of serious psychological disorders is 2.5 times higher among those below the poverty line (CDC, 2014). Like so many other *correlations*, the poverty-disorder association raises further questions: Does poverty cause disorders? Or do disorders cause poverty? It is both, though the answer varies with the disorder. Schizophrenia understandably leads to poverty. Yet the stresses and demoralization of poverty can also precipitate disorders, especially depression in women and substance abuse in men (Dohrenwend et al., 1992). In one natural experiment investigating the poverty-pathology link, researchers tracked rates of behavior problems in North Carolina Native American children as economic development enabled a dramatic reduction in their community's poverty rate. As the study began, children of poverty exhibited more deviant and aggressive behaviors. After four years, children whose families had moved above the poverty line exhibited a 40 percent decrease in behavior problems. Those who maintained their previous positions below or above the poverty line exhibited no change (Costello et al., 2003).

TABLE 65.3 Risk and Protective Factors for Mental Disorders

Risk Factors	Protective Factors
Academic failure Birth complications Caring for those who are chronically ill or who have a neurocognitive disorder Child abuse and neglect Chronic insomnia Chronic pain Family disorganization or conflict Low birth weight Low socioeconomic status Medical illness Neurochemical imbalance Parental mental illness Parental substance abuse Personal loss and bereavement Poor work skills and habits Reading disabilities Sensory disabilities Social incompetence Stressful life events Substance abuse Trauma experiences	Aerobic exercise Community offering empowerment, opportunity, and security Economic independence Effective parenting Feelings of mastery and control Feelings of security High self-esteem Literacy Positive attachment and early bonding Positive parent-child relationships Problem-solving skills Resilient coping with stress and adversity Social and work skills Social support from family and friends

Research from: World Health Organization (WHO, 2004b,c).

At what times of life do disorders strike? Usually by early adulthood. "Over 75 percent of our sample with any disorder had experienced [their] first symptoms by age 24," reported Lee Robins and Darrel Regier (1991, p. 331). Among the earliest to appear are the symptoms of antisocial personality disorder (median age 8) and of phobias (median age 10). Alcohol use disorder, obsessive-compulsive disorder, bipolar disorder, and schizophrenia symptoms appear at a median age near 20. Major depressive disorder often hits somewhat later, at a median age of 25.

✓ Check Your Understanding

Ask Yourself

- How would you draw the line between sending mentally ill criminals to prisons or to psychiatric hospitals? Would the person's history (for example, having suffered child abuse) influence your decision?

Test Yourself

- What is the biopsychosocial approach, and why is it important in our understanding of psychological disorders?
- What is the relationship between poverty and psychological disorders?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 65 REVIEW

65-1 How do we draw the line between normality and disorder?

- According to psychologists and psychiatrists, a *psychological disorder* is a syndrome marked by a clinically significant disturbance in an individual's cognition, emotion regulation, or behavior.
- Disordered thoughts, emotions, or behaviors are dysfunctional or maladaptive, interfering with normal daily life.

65-2 How do the medical model and the biopsychosocial approach influence our understanding of psychological disorders?

- The *medical model* assumes that psychological disorders are mental illnesses with physical causes that can be diagnosed, treated, and, in most cases, cured through therapy, sometimes in a hospital.
- The biopsychosocial approach assumes that three sets of influences—biological, psychological, and social-cultural—interact to produce specific psychological disorders.
- Culture-specific disorders, the vulnerability stress model, and *epigenetics* all provide insight into the ways in which biology and environment interact to make it more or less likely that a psychological disorder will develop.

65-3 How and why do clinicians classify psychological disorders, and why do some psychologists criticize the use of diagnostic labels?

- The American Psychiatric Association's *DSM-5 (Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition) contains diagnostic labels and descriptions that provide a common language and shared concepts for communication and research.

- Classification helps psychiatrists and psychologists to *predict* a disorder’s future course, *suggest* treatment, and *prompt* research into its causes.
- Some critics believe the DSM casts too wide a net and may pathologize normal behaviors. Other critics view DSM diagnoses as arbitrary labels that create preconceptions that bias perceptions of the labeled person’s past and present behavior.

65-4 Why is there controversy over attention-deficit/hyperactivity disorder?

- A child who displays inattention, hyperactivity, and impulsivity may be diagnosed with *attention-deficit/hyperactivity disorder (ADHD)* and treated with medication and other therapy.
- The controversy centers on whether the growing number of ADHD cases reflects overdiagnosis or increased awareness of the disorder. Long-term effects of stimulant-drug treatment for ADHD are not yet known.

65-5 Do psychological disorders predict violent behavior?

- Most violent criminals are not mentally ill, and most mentally ill people are not violent. People with disorders are more likely to be victims than attackers.
- Whether people with mental disorders who become violent should be held responsible for their behavior raises moral and ethical questions. Psychology and law must often work hand-in-hand to determine the best course of action.

65-6 How many people have, or have had, a psychological disorder? Is poverty a risk factor?

- Psychological disorder rates vary, depending on the time and place of the survey. In one multinational survey, rates for any disorder ranged from 6 percent (Nigeria) to 27 percent (the United States).

- Poverty is a risk factor: Conditions and experiences associated with poverty contribute to the development of psychological disorders. But some disorders, such as schizophrenia, can drive people into poverty.

Multiple-Choice Questions

1. Which of the following describes the idea that psychological disorders result from an interplay of a variety of factors?

a. Taijin-kyofusho
b. The DSM–5
c. The biopsychosocial approach
d. Amok
e. The medical model

2. Which of the following is the primary purpose of the DSM–5?

a. Describing mental disorders
b. Selecting appropriate psychological therapies for mental disorders
c. Placing mental disorders in their appropriate cultural context
d. Selecting appropriate medicines to treat mental disorders
e. Understanding the causes of mental disorders

3. The better predictor(s) of violence is (are):

I. Use of alcohol or drugs
II. Previous violence
III. Psychological disorders

a. I & II only
b. II & III only
c. I & III only
d. III only
e. I, II, & III

4. The nation with the highest reported rates of psychological disorders is

a. Ukraine.

b. China.
c. Nigeria.
d. the United States.
e. France.

Practice FRQs

1. Name and describe the two major approaches to understanding psychological disorders.

Answer

2 points: The medical model attempts to first diagnose and then treat psychological disorders. Page 667

2 points: The biopsychosocial approach attempts to understand psychological disorders as an interaction of biological, psychological, and social-cultural factors. Page 668

2. Explain two criticisms of the DSM–5.

(2 points)

Module **66 Anxiety Disorders, Obsessive-Compulsive Disorder, and Posttraumatic Stress Disorder**

LEARNING TARGETS

- **66-1 Contrast generalized anxiety disorder, panic disorder, and phobias.**
- **66-2 Describe *obsessive-compulsive disorder* (*OCD*).**
- **66-3 Describe *posttraumatic stress disorder* (*PTSD*).**
- **66-4 Examine how conditioning, cognition, and biology contribute to the feelings and thoughts that mark anxiety disorders, OCD, and PTSD.**

Anxiety is part of life. Speaking in front of a class, peering down from a ladder, or waiting to play in a big game, any one of us might feel anxious. Anxiety may even cause us to avoid talking or making eye contact —"shyness," we call it. Fortunately for most of us, our uneasiness is not intense and persistent. Some, however, are more prone to fear the unknown and to notice and remember perceived threats (Gorka et al., 2017; Mitte, 2008). When the brain's danger-detection system becomes hyperactive, we are at greater risk for an *anxiety disorder* and for two other disorders that involve anxiety: *obsessive-compulsive disorder (OCD)* and *posttraumatic stress disorder (PTSD).*[1]

Anxiety Disorders

Flip It Video: Anxiety Disorders

66-1 How do generalized anxiety disorder, panic disorder, and phobias differ?

The **anxiety disorders** are marked by distressing, persistent anxiety or by dysfunctional anxiety-reducing behaviors. For example, people with **social anxiety disorder** become extremely anxious in social settings where others might judge them, such as parties, class presentations, or even eating in public. To stave off anxious thoughts and feelings (including physical symptoms such as sweating and trembling), they may avoid going out at all. Even though this behavior reduces their anxiety, it is maladaptive—it does not help them cope with their world.

anxiety disorders

psychological disorders characterized by distressing, persistent anxiety or maladaptive behaviors that reduce anxiety.

social anxiety disorder

intense fear and avoidance of social situations. (Formerly called *social phobia*.)

Let’s take a closer look at three other anxiety disorders:

- *Generalized anxiety disorder*, in which a person is unexplainably and continually tense and uneasy.
- *Panic disorder*, in which a person experiences *panic attacks*—sudden episodes of intense dread—and fears the next episode’s unpredictable onset.
- *Phobias*, in which a person is intensely and irrationally afraid of a specific object, activity, or situation.

Generalized Anxiety Disorder

For two years, Tom, a 27-year-old electrician, was bothered by dizziness, sweating palms, and heart palpitations. He felt on edge and sometimes found himself shaking. Tom was fairly successful in hiding his symptoms from his family and co-workers. But he allowed himself few other social contacts, and occasionally he had to leave work. Neither his family doctor nor a neurologist was able to find any physical problem.

Tom’s unfocused, out-of-control, agitated feelings suggest **generalized anxiety disorder**, which is marked by excessive and uncontrollable worry that persists for six months or more. People with this condition (two-thirds are women) worry continually, and they are often jittery, agitated, and sleep-deprived (McLean & Anderson, 2009). Their gaze becomes fixated on potential threats (Pergamin-Hight et al., 2015). Concentration is difficult as attention switches from worry to worry. Their tension and apprehension may leak out through furrowed brows, twitching eyelids, trembling, perspiration, or fidgeting from *autonomic nervous system* arousal.

generalized anxiety disorder

an anxiety disorder in which a person is continually tense, apprehensive, and in a state of autonomic nervous system arousal.

The person usually cannot identify, and therefore relieve or avoid, the tension’s cause. To use Sigmund Freud’s term, the anxiety is *free-floating* (not linked to a specific stressor or threat). Generalized anxiety disorder is often accompanied by depressed mood, but even without depression it tends to be disabling (Hunt et al., 2004; Moffitt et al., 2007). Moreover, it may lead to physical problems, such as high blood pressure. As time passes, however, emotions tend to mellow, and by age 50, generalized anxiety disorder becomes fairly rare (Rubio & López-Ibor, 2007).

Panic Disorder

Many people can experience an intense anxiety that escalates into a terrifying panic attack—a minutes-long episode of intense fear that something horrible is about to happen. Irregular heartbeat, chest pains, shortness of breath, choking, trembling, or dizziness may accompany the panic. One woman recalled suddenly feeling

> hot and as though I couldn't breathe. My heart was racing and I started to sweat and tremble and I was sure I was going to faint. Then my fingers started to feel numb and tingly and things seemed unreal. It was so bad I wondered if I was dying and asked my husband to take me to the emergency room. By the time we got there (about 10 minutes) the worst of the attack was over and I just felt washed out (Greist et al., 1986).

For the 3 percent of people with **panic disorder**, panic attacks are recurrent. These anxiety tornados strike suddenly, wreak havoc, and disappear, but are not forgotten. Ironically, worries about anxiety—perhaps fearing another panic attack, or fearing anxiety-related symptoms in public—can amplify anxiety symptoms (Olatunji & Wolitzky-Taylor, 2009). After several panic attacks, people may avoid situations where panic might strike. If their fear is intense enough, people may develop **agoraphobia**—fear or avoidance of public situations from which escape might be difficult. Given such fear, people may avoid being outside the home, in a crowd, or in an elevator. Smokers have at least a doubled risk of panic disorder and greater symptoms when they do have an attack (Knuts et al., 2010; Zvolensky & Bernstein, 2005). Because nicotine is a stimulant, lighting up doesn't lighten us up.

panic disorder

an anxiety disorder marked by unpredictable, minutes-long episodes of intense dread in which a person may experience terror and accompanying chest pain, choking, or other frightening sensations; often followed by worry over a possible next attack.

agoraphobia

fear or avoidance of situations, such as crowds or wide open places, where one has felt loss of control and panic.

Charles Darwin began suffering from panic disorder at age 28, after spending five years sailing the world. He moved to the country, avoided social gatherings, and traveled only in his wife’s company. But the relative seclusion did free him to develop his evolutionary theory. “Even ill health,” he reflected, “has saved me from the distraction of society and its amusements” (quoted in Ma, 1997).

Sam Greenwood/Getty Images

Panic on the course Golfer Charlie Beljan experienced what he later learned were panic attacks during an important tournament. His thumping heartbeat and shortness of breath led him to think he was having a heart attack. But hospital tests revealed that his symptoms were not related to a physical illness. He recovered, went on to win $846,000, and has become an inspiration to others.

Phobias

We all live with some fears. But people with **phobias** are consumed by a persistent, irrational fear and avoidance of some object, activity, or situation. *Specific phobias* may focus on animals, insects, heights, blood, or close spaces (**Figure 66.1**). Many people avoid the triggers (such as high places) that arouse their fear, and they manage to live with their phobia. Others are incapacitated by their efforts to avoid the feared situation. Marilyn, an otherwise healthy and happy 28-year-old, so feared thunderstorms that she felt anxious as soon as a weather forecaster mentioned possible storms later in the week. If her husband was away when a storm was forecast, she often stayed with a close relative. During a storm, she hid from windows and buried her head to avoid seeing the lightning.

phobia

an anxiety disorder marked by a persistent, irrational fear and avoidance of a specific object, activity, or situation.

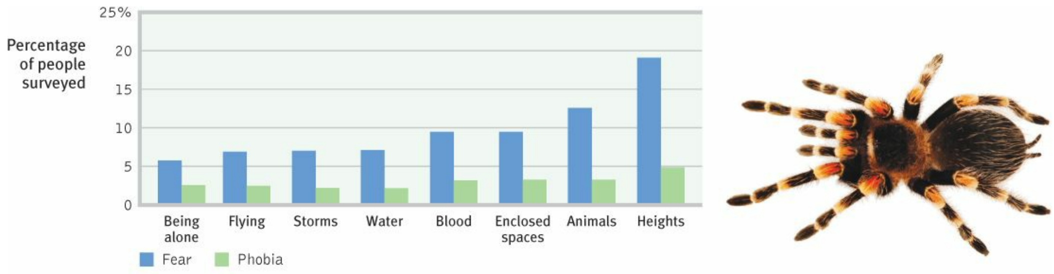


Figure 66.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Depla et al., 2008.
Photo: Martin Harvey/Getty Images

Figure 66.1 Some common and uncommon specific fears

Researchers surveyed Dutch people to identify the most common events or objects they feared. A strong fear becomes a phobia if it provokes a compelling but irrational desire to avoid the dreaded object or situation.

Check Your Understanding

Ask Yourself

- Have you ever seen a movie or TV character exhibit anxiety disorder symptoms? Based on what you've read, how realistic was the portrayal of the disorder?

Test Yourself

- Unfocused tension, apprehension, and arousal are symptoms of _______________ _______________ disorder.
- Those who experience unpredictable periods of terror and intense dread, accompanied by frightening physical sensations, may be diagnosed with a

_______________ disorder.

- If a person is focusing anxiety on specific feared objects or situations, that person may have a _______________.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Obsessive-Compulsive Disorder (OCD)

66-2 What is OCD?

As with the anxiety disorders, we can see aspects of **obsessive-compulsive disorder (OCD)** in our everyday behavior. *Obsessive thoughts* are unwanted and so repetitive it may seem they will never go away. *Compulsive behaviors* are often responses to those thoughts.

obsessive-compulsive disorder (OCD)
a disorder characterized by unwanted repetitive thoughts (obsessions), actions (compulsions), or both.

We are all at times obsessed with thoughts, and we may behave compulsively. Have you ever felt a bit anxious about how your living space will appear to others and found yourself checking and cleaning one last time before your guests arrived? Or, perhaps worried about an upcoming test, you caught yourself lining up books or devices "just so" before you began studying? Our lives are full of little rehearsals and fussy behaviors. They cross the fine line between normality and disorder when they *persistently interfere* with everyday living and cause distress. Checking that you locked the door is normal; checking 10 times is not. Washing your hands is normal; washing so often that your skin becomes raw is not. (**Table 66.1** offers more examples.) At some time during their lives, often during their late teens or twenties, about 2 percent of people cross that line from normal preoccupations and fussiness to debilitating disorder (Kessler et al., 2012). Although people know their anxiety-fueled obsessive thoughts are irrational, these thoughts can become so haunting, and the compulsive rituals so senselessly time-consuming, that effective functioning becomes impossible.

TABLE 66.1 Common Obsessions and Compulsions Among Children and Adolescents With Obsessive-Compulsive Disorder

and Adolescents With Obsessive-Compulsive Disorder

Thought or Behavior	Percentage Reporting Symptom
Obsessions (repetitive *thoughts*)	
Concern with dirt, germs, or toxins	40
Something terrible happening (fire, death, illness)	24
Symmetry, order, or exactness	17
Compulsions (repetitive *behaviors*)	
Excessive hand washing, bathing, toothbrushing, or grooming	85
Repeating rituals (in/out of a door, up/down from a chair)	51
Checking doors, locks, appliances, car brakes, homework	46

Data from: Rapoport, 1989.

OCD is more common among teens and young adults than among older people (Samuels & Nestadt, 1997). A 40-year follow-up study of 144 Swedish people diagnosed with the disorder found that, for most, the obsessions and compulsions had gradually lessened, though only 1 in 5 had completely recovered (Skoog & Skoog, 1999).

Michael Campanella/WireImage/Getty Images

Thriving with OCD Music star Justin Timberlake has openly discussed his obsessive-compulsive disorder. He says that support from family and a rich sense of humor have helped him cope with the challenges.

Some people experience other OCD-related disorders, such as *hoarding disorder* (cluttering one's space with acquired possessions one can't let go), *body dysmorphic disorder* (preoccupation with perceived body defects), or—new words to impress your friends—*trichotillomania* (hair-pulling) or *excoriation disorder* (excessive skin-picking).

Posttraumatic Stress Disorder (PTSD)

66-3 What is PTSD?

While serving his country in war, one soldier, Jesse, saw the killing “of children and women. It was just horrible for anyone to experience.” Back home, he suffered “real bad flashbacks” (Welch, 2005).

Jesse is not alone. In one study of 103,788 veterans returning from Iraq and Afghanistan, 25 percent were diagnosed with a psychological disorder (Seal et al., 2007). Some had *traumatic brain injuries* (*TBI)*, but the most frequent diagnosis was **posttraumatic stress disorder (PTSD)**. Survivors of accidents, disasters, and violent and sexual assaults (including an estimated two-thirds of prostitutes) have also experienced PTSD symptoms (Brewin et al., 1999; Guo et al., 2017; Farley et al., 1998). Typical symptoms include recurring haunting memories and nightmares, laser-focused attention to possible threats, social withdrawal, jumpy anxiety, and trouble sleeping (Germain, 2013; Hoge et al., 2007; Yuval et al., 2017).

posttraumatic stress disorder (PTSD)

a disorder characterized by haunting memories, nightmares, hypervigilance, social withdrawal, jumpy anxiety, numbness of feeling, and/or insomnia that lingers for four weeks or more after a traumatic experience.

About half of us will experience at least one traumatic event in our lifetime. And many people will display *survivor resiliency*—by recovering after severe stress (Bonanno, 2004, 2005; Infurna & Luthar, 2016). Although Friedrich Nietzsche’s (1889) surmise that “what does not kill me makes me stronger” is not true for all, some will even experience *posttraumatic growth* (see Unit XIII). Why do some 5 to 10 percent of people develop PTSD after a traumatic event, but others don’t (Bonanno et al., 2011)? One factor seems to be the amount of trauma-related emotional distress: The higher the distress, such as the level of physical torture suffered by prisoners of war, the greater the risk for posttraumatic symptoms (King et al., 2015; Ozer et al., 2003). Among American military personnel in Afghanistan, 7.6 percent of combatants developed PTSD, compared with 1.4 percent of noncombatants (McNally, 2012). Among survivors of the 9/11 terrorist attacks on New York's World Trade Center, the rates of subsequent PTSD diagnoses for those who had been inside were double the rates of those who had been outside (Bonanno et al., 2006).

LYNN JOHNSON/National Geographic Creative

Bringing the war home Hundreds of thousands of Iraq and Afghanistan war veterans have been diagnosed with PTSD or traumatic brain injury (TBI) (VA, 2017). Many vets participate in an intensive recovery program using deep breathing, massage, and group and individual discussion techniques to treat their PTSD or TBI.

What else can influence PTSD development? Some people may have a more sensitive emotion-processing limbic system that floods their bodies with stress hormones, which explains why PTSD may coexist with another disorder (Duncan et al., 2017; Kosslyn, 2005; Ozer & Weiss, 2004). Genes and gender also matter. Twins, compared with nontwin siblings, more commonly share PTSD cognitive risk factors (Gilbertson et al., 2006). And the odds of experiencing PTSD after a traumatic event are about two times higher for women than for men (Olff et al., 2007; Ozer & Weiss, 2004).

Some psychologists believe that PTSD has been overdiagnosed (Dobbs, 2009; McNally, 2003). Too often, say critics, PTSD gets stretched to include normal stress-related bad memories and dreams. And some well-intentioned procedures—such as “debriefing” people by asking them to revisit the experience and vent their emotions—may worsen stress reactions (Bonanno et al., 2010; Wakefield & Spitzer, 2002). Other research shows that reliving traumas (such as 9/11 or the Boston Marathon bombing) through media coverage sustains the stress response (Holman et al., 2014).

✓ Check Your Understanding

Ask Yourself

- Have you ever experienced obsessive thoughts or compulsive behaviors? Did they interfere with your day-to-day functioning?

Test Yourself

- Those who express anxiety through unwanted repetitive thoughts or actions may have a(n) ______________-______________ disorder.
- Those with symptoms of recurring memories and nightmares, social withdrawal, jumpy anxiety, numbness of feeling, and/or insomnia for weeks after a traumatic event may be diagnosed with ______________ ______________ disorder.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Understanding Anxiety Disorders, OCD, and PTSD

66-4 How do conditioning, cognition, and biology contribute to the feelings and thoughts that mark anxiety disorders, OCD, and PTSD?

Anxiety is both a feeling and a cognition—a doubt-laden appraisal of one’s safety or social skill. How do these anxious feelings and cognitions arise? Sigmund Freud’s psychoanalytic theory proposed that, beginning in childhood, people *repress* intolerable impulses, ideas, and feelings. Freud believed that this submerged mental energy sometimes leaks out in odd symptoms, such as anxious handwashing. Few of today’s psychologists share Freud’s interpretation of anxiety. Most believe that three modern perspectives—conditioning, cognition, and biology—are more helpful.

AP® EXAM TIP

The AP® Exam may also include references to the *psychoanalytic* and *humanistic* approaches to explaining psychological disorders. Relatively few modern therapists make use of these historically important approaches (see Module 70).

Conditioning

Through *classical conditioning*, our fear responses can become linked with formerly neutral objects and events. In a classic experiment, an infant—“Little Albert”—learned to fear furry objects that researchers paired with loud noises (see Module 26). In other experiments, researchers have created anxious animals by giving rats unpredictable electric shocks (Schwartz, 1984). The rats, like assault victims who report feeling anxious when returning to the scene of the crime, had learned to become uneasy in their lab environment. The lab had become a cue for fear.

AP® EXAM TIP

This is a good time to review Unit I, specifically, the behavioral, biological, cognitive, and evolutionary perspectives. Be able to discuss what these approaches focus on and how they explain behavior.

Such research helps explain why anxious or traumatized people learn to associate their anxiety with certain cues (Bar-Haim et al., 2007; Duits et al., 2015). In one survey, 58 percent of those with social anxiety disorder experienced their disorder after a traumatic event (Ost & Hugdahl, 1981). Anxiety or an anxiety-related disorder is more likely to develop when bad events happen unpredictably and uncontrollably (Field, 2006; Mineka & Oehlberg, 2008). Even a single painful and frightening event may trigger a full-blown phobia, thanks to two conditioning processes: classical conditioning's *stimulus generalization* and operant conditioning's *reinforcement.*

Stimulus generalization occurs when a person experiences a fearful event and later develops a fear of similar events. My [DM's] car was once struck by a driver who missed a stop sign. For months afterward, I felt a twinge of unease when any car approached from a side street. Likewise, I [ND] was watching a terrifying movie about spiders, *Arachnophobia*, when a severe thunderstorm struck and the theater lost power. For months, I experienced anxiety at the sight of spiders or cobwebs. Those fears eventually disappeared, but sometimes fears linger and grow. Marilyn's thunderstorm phobia may have similarly generalized after a terrifying or painful experience during a thunderstorm.

AP® EXAM TIP

Review time: Think about the reinforcement examples provided here. Do they describe *positive* or *negative* reinforcement?[2]

Reinforcement helps maintain learned fears and anxieties. Anything that enables us to avoid or escape a feared situation can reinforce maladaptive behaviors. Fearing a panic attack, we may decide not to leave the house. Reinforced by feeling calmer, we are likely to repeat that behavior in the future (Antony et al., 1992). So, too, with compulsive behaviors. If washing our hands relieves our feelings of anxiety, we may wash our hands again when those feelings return.

Cognition

Conditioning influences our feelings of anxiety, but so does cognition—our thoughts, memories, interpretations, and expectations. By observing others, we can learn to fear what they fear. Nearly all monkeys raised in the wild fear snakes, yet lab-raised monkeys do not. Surely, most wild monkeys do not actually suffer snake bites. Do they learn their fear through observation? To find out, Susan Mineka (1985, 2002) experimented with six monkeys raised in the wild (all strongly fearful of snakes) and their lab-raised offspring (virtually none of which feared snakes). After repeatedly observing their parents or peers refusing to reach for food in the presence of a snake, the younger monkeys developed a similar strong fear of snakes. When the monkeys were retested three months later, their learned fear persisted. We humans similarly learn many of our own fears by observing others (Helsen et al., 2011; Olsson et al., 2007).

Hemera Technologies/PhotoObjects.net/360/Getty Images

Our past experiences shape our expectations and influence our interpretations and reactions. Whether we interpret the creaky sound simply as the wind or as a possible knife-wielding attacker determines whether we panic. People with anxiety disorders tend to be *hypervigilant*. They *attend* more to threatening stimuli. They more often *interpret* unclear stimuli as threatening: A pounding heart signals a heart attack; a lone spider near the bed indicates a likely infestation; an everyday disagreement with a friend or boss spells doom for the relationship. And they more often *remember* threatening events (Van Bockstaele et al., 2014). Anxiety is especially common when people cannot switch off such intrusive thoughts and perceive a loss of control and a sense of helplessness (Franklin & Foa, 2011).

Biology

There is, however, more to anxiety disorders, OCD, and PTSD than conditioning and cognitive processes alone. Why do some of us develop lasting phobias or PTSD after suffering traumas, but others do not? Why do we all learn some fears so readily than others? The answers lie in part in our biology.

Genes

Among monkeys, fearfulness runs in families. A monkey reacts more strongly to stress if its close biological relatives are anxiously reactive (Suomi, 1986). So, too, with people. If one identical twin has an anxiety disorder, the other is also at risk (Polderman et al., 2015). Even when raised separately, identical twins may develop similar phobias (Carey, 1990; Eckert et al., 1981). One pair of 35-year-old identical twins independently became so afraid of water that each would wade in the ocean backward and only up to her knees.

Given the genetic contribution to anxiety disorders, researchers are sleuthing the culprit genes. One research team identified 17 gene variations associated with typical anxiety disorder symptoms (Hovatta et al., 2005). Other teams have found genes associated specifically with OCD (Mattheisen et al., 2015; Taylor, 2013).

Some genes influence disorders by regulating brain levels of neurotransmitters. These include *serotonin*, which influences sleep, mood, and attending to threats (Canli, 2008; Pergamin-Hight et al., 2012), and *glutamate*, which heightens activity in the brain's alarm centers (Lafleur et al., 2006; Welch et al., 2007).

So genes matter. Some of us have genes that make us like orchids—fragile, yet capable of beauty under favorable circumstances. Others of us are like dandelions—hardy, and able to thrive in varied circumstances (Ellis & Boyce, 2008; Pluess & Belsky, 2013).

But experience affects gene expression. Among those with PTSD, a history of child abuse leaves long-term *epigenetic marks*, which are often organic molecules. These molecular tags attach to our chromosomes and turn certain genes on or off. Thus, experiences such as abuse can increase the likelihood that a genetic vulnerability to a disorder will be expressed (Mehta et al., 2013; Zannas et al., 2015). People who commit suicide show a similar epigenetic effect (Lockwood et al., 2015; McGowan et al., 2009).

The Brain

Our experiences change our brain, paving new pathways. Traumatic fear-learning experiences can leave tracks in the brain, creating fear circuits within the amygdala (Etkin & Wager, 2007; Herringa et al., 2013; Kolassa & Elbert, 2007). These fear pathways create easy inroads for more fear experiences (Armony et al., 1998).

Generalized anxiety disorder, panic attacks, phobias, OCD, and PTSD express themselves biologically as overarousal of brain areas involved in impulse control and habitual behaviors. These disorders reflect a brain danger-detection system gone hyperactive—producing anxiety when no danger exists. In OCD, for example, when the brain detects that something is amiss, it seems to generate a mental hiccup of repeating thoughts (obsessions) or actions (compulsions) (Gehring et al., 2000). Brain scans of people with PTSD show higher-than-normal activity in the amygdala when they view traumatic images (Etkin & Wager, 2007). Brain scans of people with OCD reveal elevated activity in specific brain areas during behaviors such as compulsive hand washing, checking, ordering, or hoarding (Insel, 2010; Mataix-Cols et al., 2004, 2005). The *anterior* *cingulate cortex,* a brain region that monitors our actions and checks for errors, seems especially likely to be hyperactive (Maltby et al., 2005) (**Figure 66.2**).

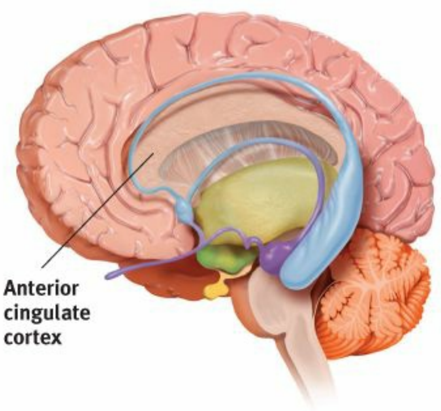


Figure 66.2
Myers/DeWall, *Myers' Psychology for the AP®*
Course, 3e, © 2018 Worth Publishers

Figure 66.2 An obsessive-compulsive brain

When people engaged in a challenging cognitive task, those with OCD showed the most activity in the anterior cingulate cortex in the brain's frontal area (Maltby et al., 2005).

Some antidepressant drugs dampen this fear-circuit activity and its associated obsessive-compulsive behavior. Fears can also be blunted by giving people drugs as they recall and then rerecord ("reconsolidate") a traumatic experience (Kindt et al., 2009; Norberg et al., 2008). Although they don't forget the experience, the associated emotion is largely erased.

Natural Selection

We seem biologically prepared to fear threats faced by our ancestors. Our phobias focus on such specific fears: spiders, snakes, and other animals; enclosed spaces and heights; storms and darkness. Those fearless about these occasional threats were less likely to survive and leave descendants. Even in Britain, with only one poisonous snake species, people often fear snakes. Nine-month-old infants attend more to sounds signaling ancient threats (hisses, thunder) than they do to sounds representing modern dangers (a bomb exploding, breaking glass) (Erlich et al., 2013). It is easy to condition and hard to extinguish fears of such "evolutionarily relevant" stimuli (Coelho & Purkis, 2009; Davey, 1995; Öhman, 2009). Some of our modern fears can also have an evolutionary explanation. A fear of flying may be rooted in our biological predisposition to fear confinement and heights.

Peter Bohler/Redux Pictures

Fearless The biological perspective helps us understand why most people have more fear of heights than does Alex Honnold, shown here in 2017 becoming the first person to free solo climb (no safety ropes) Yosemite National Park's El Capitan granite wall.

Compare our easy-to-learn fears with those we *do not* easily learn. World War II air raids, for example, produced remarkably few lasting phobias. As the air blitzes continued, the British, Japanese, and German populations did not become more and more panicked. Rather, they grew increasingly indifferent to planes outside their immediate neighborhoods (Mineka & Zinbarg, 1996). Evolution has not prepared us to fear bombs dropping from the sky.

Just as our phobias focus on dangers faced by our ancestors, our compulsive acts typically exaggerate behaviors that contributed to our species' survival. Grooming had survival value. Gone wild, it becomes compulsive hair pulling. So too with washing up, which becomes ritual hand washing. And checking territorial boundaries becomes checking and rechecking already locked doors (Rapoport, 1989). Although natural selection shaped our behaviors, when taken to an extreme, these behaviors can interfere with daily life.

✓ Check Your Understanding

Ask Yourself

- Can you recall a fear that you have learned? What role did conditioning or cognition play?

Test Yourself

- Researchers believe that conditioning and cognitive processes contribute to anxiety-related disorders. What biological factors also contribute to these disorders?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 66 REVIEW

66-1 How do generalized anxiety disorder, panic disorder, and phobias differ?

- Anxious feelings and behaviors are classified as an *anxiety disorder* when they form a pattern of distressing, persistent anxiety or maladaptive behaviors that reduce anxiety.
- People with *generalized anxiety disorder* feel persistently and uncontrollably tense and apprehensive for no apparent reason.
- In the more extreme *panic disorder*, anxiety escalates into periodic episodes of intense dread.
- Those with a *phobia* may be irrationally afraid of a specific object, activity, or situation.

66-2 What is *OCD?*

- Persistent and repetitive thoughts (obsessions) and behaviors (compulsions) characterize *obsessive-compulsive disorder (OCD).*

66-3 What is *PTSD?*

- Symptoms of *posttraumatic stress disorder (PTSD)* include haunting memories, nightmares, social withdrawal, jumpy anxiety, and sleep problems following some traumatic experience.

66-4 How do conditioning, cognition, and biology contribute to the feelings and thoughts that mark anxiety disorders, OCD, and PTSD?

- Through conditioning, anxious or traumatized people may learn to associate their anxiety with certain cues. *Stimulus generalization* occurs when someone experiences a fearful event and later develops a fear of similar events. *Reinforcement* helps maintain learned fears and anxieties.

- Cognition can influence our expectations and our interpretation of and reaction to stimuli. We may learn some fears by observing others' fears. People with anxiety disorders tend to be hypervigilant: They attend more to threatening stimuli, more often interpret ambiguous stimuli as threatening, and remember threatening events.
- Our biology also plays a role. Genetic predispositions for high levels of emotional reactivity and neurotransmitter production make us vulnerable to disorder, as do epigenetic marks. Abnormal responses in the brain's fear circuits can create inroads for disorder. Natural selection and evolution have prepared us to fear the threats our ancestors faced.

Multiple-Choice Questions

1. Andrew is so afraid of spiders that he is having a hard time leaving his "spider-proofed" home and going to work. Andrew's psychiatrist has diagnosed him with

a. agoraphobia.
b. a phobia.
c. panic disorder.
d. generalized anxiety disorder.
e. posttraumatic stress disorder.

2. Leo is always so worried that something bad is about to happen that he can't stay focused at school. A therapist might best diagnose Leo with

a. panic disorder.
b. a phobia.
c. obsessive-compulsive disorder.
d. generalized anxiety disorder.
e. susto.

3. In obsessive-compulsive disorder, obsessions are repetitive _________, and compulsions are repetitive __________.

a. behaviors; thoughts
b. behaviors; experiences
c. thoughts; behaviors
d. concerns; memories
e. thoughts; concerns

4. Which area of the brain exhibits higher-than-normal activity in many people with PTSD?

a. Amygdala
b. Hippocampus
c. Hypothalamus
d. Reticular formation
e. Occipital lobe

5. Rebekah has grown increasingly nervous about going to school and social gatherings. When she is assigned a presentation in English class, she is so terrified that her teacher and classmates will judge her harshly that she can't bring herself to go to school at all. A therapist would be most likely to diagnose her with

a. ADHD.
b. panic disorder.
c. obsessive-compulsive disorder.
d. social anxiety disorder.
e. posttraumatic stress disorder.

Practice FRQs

1. Using psychological terminology, describe how each of the following perspectives helps us understand anxiety disorders, OCD, and PTSD:

- Conditioning
- Cognition
- Biology

Answer

1 point: The conditioning perspective would consider how a person could learn debilitating fears of various objects and situations. This might happen by way of *reinforcement*, when the behavior of avoiding a feared stimulus is reinforced by reduced anxiety, or *stimulus generalization*, when a person experiences a fearful situation and then generalizes that fear to similar stimuli. Pages 681–682

1 point: The cognition perspective would consider how expectations and interpretations might cause a person to overreact to stimuli, and how people may learn some fears by observing others’ fears. Page 682

1 point: The biology perspective would consider how genetic predispositions, epigenetic marks, abnormal brain responses, and natural selection could make us vulnerable to the development of these disorders. Pages 683–684

2. Steve recently lost his job. For each of the disorders below, explain how that diagnosis could have affected his job performance:

- Agoraphobia
- Panic disorder
- Obsessive-compulsive disorder

(3 points)

Module **67 Depressive Disorders, Bipolar Disorder, Suicide, and Self-Injury**

LEARNING TARGETS

- **67-1 Contrast major depressive disorder, persistent depressive disorder, and bipolar disorder.**
- **67-2 Analyze how the biological and social-cognitive perspectives help us understand depressive disorders and bipolar disorder.**
- **67-3 Explain what factors increase the risk of suicide, and discuss what we know about nonsuicidal self-injury.**

67-1 How do major depressive disorder, persistent depressive disorder, and bipolar disorder differ?

In the past year, have you at some time “felt so depressed that it was difficult to function”? If so, you were not alone. In one national survey, 31 percent of American college students answered *Yes* (ACHA, 2009). In a survey of American high school students, 29 percent “felt so sad or hopeless almost every day for 2 or more weeks in a row that they stopped doing some usual activities” (CDC, 2008). You might feel deeply discouraged about the future, dissatisfied with your life, or socially isolated. You may lack the energy to get things done, to see people, or even to force yourself out of bed. You may be unable to concentrate, eat, or sleep normally. You may even wonder if you would be better off dead.

Perhaps academic success came easily to you in middle school, but now you find that disappointing grades jeopardize your goals. Maybe social stress, such as loneliness, feeling you are the target of prejudice, or experiencing a romantic breakup, has plunged you into despair. And perhaps low self-esteem increases your brooding, worsening your self-torment (Orth et al., 2016). Likely you think you are more alone in having such negative feelings than you really are (Jordan et al., 2011). Most of us have had some direct or indirect experience with depression: Misery has more company than most suppose.

> “*My life had come to a sudden stop. I was able to breathe, to eat, to drink, to sleep. I could not, indeed, help doing so; but there was no real life in me.*”
>
> *Leo Tolstoy,* My Confession, *1887*

Joy, contentment, sadness, and despair exist at different points on a continuum, points at which any of us may find ourselves at any given moment. To feel bad in reaction to profoundly sad events is to be in touch with reality. In such times, sadness is like a car’s low-fuel light—a warning signal that we should stop and take appropriate measures. Biologically speaking, life’s purpose is not happiness but survival and reproduction. Coughing, vomiting, swelling, and pain protect the body from dangerous toxins and stimuli. Similarly, depression resembles a sort of psychic hibernation: It slows us down, prompting us, when losing a relationship or blocked from a goal, to conserve energy (Beck & Bredemeier, 2016; Gershon et al., 2016). There is sense to suffering. When we grind temporarily to a halt and reassess our life, as depressed people do, we can redirect our energy in more promising ways (Watkins, 2008). Even mild sadness helps people process and recall faces more accurately (Hills et al., 2011). They also tend to pay more attention to details, think more critically (with less gullibility), and make better decisions (Forgas, 2009, 2013).

> “*If someone offered you a pill that would make you permanently happy, you would*

be well advised to run fast and run far. Emotion is a compass that tells us what to do, and a compass that is perpetually stuck on NORTH is worthless.”

Daniel Gilbert, “The Science of Happiness,” 2006

But sometimes this response, taken to an extreme, can become seriously maladaptive and signal a disorder. The difference between a blue mood after bad news and a depression-related disorder is like the difference between breathing heavily after a hard run and being chronically exhausted.

Brad Wenner/Getty Images

In this section, we consider three disorders in which depression impairs daily living, focusing on the two principal forms (formerly known as *mood disorders*). *Major depressive disorder* is a state of hopelessness and lethargy lasting several weeks or months. *Persistent depressive disorder* is similar, but with milder depressive symptoms that last a much longer period of time. *Bipolar disorder (*formerly called *manic-depressive disorder*) is when a person alternates between depression and overexcited hyperactivity.

Major Depressive Disorder

Major depressive disorder occurs when at least five signs of depression (including either depressed mood or loss of interest or pleasure) last two or more weeks (**Table 67.1**). To sense what major depressive disorder feels like, imagine combining the anguish of grief with the sluggishness of bad jet lag. If stress-related anxiety is a “crackling, menacing brushfire,” noted biologist Robert Sapolsky (2003), “depression is a suffocating heavy blanket thrown on top of it.”

major depressive disorder

a disorder in which a person experiences, in the absence of drugs or another medical condition, two or more weeks with five or more symptoms, at least one of which must be either (1) depressed mood or (2) loss of interest or pleasure.

TABLE 67.1 Diagnosing Major Depressive Disorder

The DSM-5 classifies major depressive disorder as the presence of at least five of the following symptoms over a two-week period of time (minimally including depressed mood or reduced interest) (American Psychiatric Association, 2013).
• Depressed mood most of the time
• Dramatically reduced interest or enjoyment in most activities most of the time
• Significant challenges regulating appetite and weight
• Significant challenges regulating sleep
• Physical agitation or lethargy
• Feeling listless or with much less energy
• Feeling worthless, or feeling unwarranted guilt
• Problems in thinking, concentrating, or making decisions
• Thinking repetitively of death and suicide

Adults diagnosed with persistent depressive disorder (also called *dysthymia*) have experienced a mildly depressed mood more often than not for two years or more (American Psychiatric Association, 2013). They also display at least two of the following symptoms:

- Difficulty with decision making and concentration
- Feeling hopeless
- Poor self-esteem
- Reduced energy levels
- Problems regulating sleep
- Problems regulating appetite

Depression is the number-one reason people seek mental health services. Indeed, the World Health Organization declared depression “the top cause of disability in the world today” (CBC, 2017; WHO, 2017b). In one survey conducted in 21 countries, 4.6 percent of people interviewed were experiencing moderate or severe depression (Thornicroft et al., 2017).

For some people, depressive symptoms may have a *seasonal pattern,* returning each winter. When asked “Have you cried today?” Americans have agreed more often in the winter (**Table 67.2**). But some researchers have found that people in northerly or cloudier places do not experience more wintertime depression, and question how often seasonal depression occurs (Traffanstedt et al., 2016). So stay tuned.

TABLE 67.2 Percentage Answering *Yes* When Asked “Have You Cried Today?”

	Percentage who cried	
	Men	Women
August	4%	7%
December	8%	21%

Data from: Time/CNN survey, 1994.

Bipolar Disorder

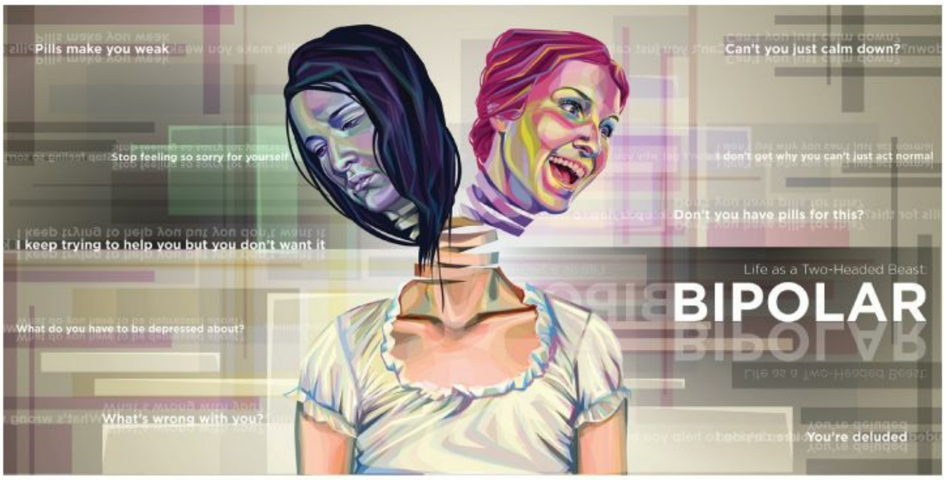
Our genes dispose some of us, more than others, to respond emotionally to good and bad events (Whisman et al., 2014). In **bipolar disorder**, people bounce from one emotional extreme to the other (week to week, rather than day to day or moment to moment). When a depressive episode ends, a euphoric, overly talkative, wildly energetic, and extremely optimistic state called **mania** follows. But before long, the mood either returns to normal or plunges again into depression.

bipolar disorder

a disorder in which a person alternates between the hopelessness and lethargy of depression and the overexcited state of mania. (Formerly called *manic-depressive disorder*.)

mania

a hyperactive, wildly optimistic state in which dangerously poor judgment is common.


Pills make you weak
Can't you just calm down?
Stop feeling so sorry for yourself
I don't get why you can't just act normal
Don't you have pills for this?
I keep trying to help you but you don't want it
Life as a Two-Headed Beast
BIPOLAR
What do you have to be depressed about?
What's wrong with you?
You're deluded

Life as a Two-Headed Beast: Bipolar, Abigail Southworth

Bipolar disorder Artist Abigail Southworth illustrated her experience of bipolar disorder.

During the manic phase, people with bipolar disorder typically have little need for sleep. They show fewer sexual inhibitions. Their positive emotions persist abnormally (Gruber, 2011; Gruber et al., 2013). Their speech is loud, flighty, and hard to interrupt. They find advice irritating. Yet they need protection from their own poor judgment, which may lead to reckless spending or unsafe sex. Thinking fast feels good, but it also increases risk taking (Chandler & Pronin, 2012; Pronin, 2013).

In milder forms, mania’s energy and flood of ideas can fuel creativity. Clusters of genes associated with high creativity increase the likelihood of having bipolar disorder, and risk factors for developing bipolar disorder predict greater creativity (Baas et al., 2016; Power et al., 2015). George Frideric Handel, who may have suffered from a mild form of bipolar disorder, composed his nearly four-hour-long *Messiah* (1742) during three weeks of intense creative energy (Keynes, 1980). Robert Schumann composed 51 musical works during two years of mania (1840 and 1849) but none during 1844, when he was severely depressed (Slater & Meyer, 1959). Those who rely on precision and logic, such as architects, designers, and journalists, suffer bipolar disorder less often than do those who rely on emotional expression and vivid imagery (Ludwig, 1995). Composers, artists, poets, novelists, and entertainers seem especially prone (Jamison, 1993, 1995; Kaufman & Baer, 2002; Ludwig, 1995). Indeed, one analysis of over a million individuals showed that the only psychiatric condition linked to working in a creative profession was bipolar disorder (Kyaga et al., 2013).

Actor Russell Brand

Writer Virginia Woolf

Humorist Samuel Clemens (Mark Twain)

Left: Dave Bedrosian/ZUMA Press/Newscom; Center: George C. Beresford/Getty Images; Right: The Granger Collection, NYC—All Rights Reserved.

Creativity and bipolar disorder There have been many creative artists, composers, writers, and musical performers with bipolar disorder.

Though bipolar disorder is much less common than major depressive disorder, it is often more dysfunctional, claiming twice as many lost workdays yearly (Kessler et al., 2006). It is also a potent predictor of suicide (Schaffer et al., 2015). Unlike major depressive disorder, bipolar disorder afflicts as many men as women. The diagnosis has risen among adolescents, whose mood swings, sometimes prolonged, may vary from raging to bubbly. In the decade between 1994 and 2003, bipolar diagnoses in Americans under the age of 20 revealed an astonishing 40-fold increase—from an estimated 20,000 to 800,000 (Carey, 2007; Flora & Bobby, 2008; Moreno et al., 2007). Americans are twice as likely as people of other countries to have ever had a diagnosis of bipolar disorder (Merikangas et al., 2011). The new DSM-5 classifications have, however, begun to reduce the number of child and adolescent bipolar diagnoses: Some of those who are persistently irritable and who have frequent and recurring behavior outbursts are now instead diagnosed with *disruptive mood dysregulation disorder* (Faheem et al., 2017).

Understanding Depressive Disorders and Bipolar Disorder

67-2 How can the biological and social-cognitive perspectives help us understand depressive disorders and bipolar disorder?

Terry Gatanis/ZUMA Press/Newscom

Life after depression J. K. Rowling, author of the Harry Potter books, reported suffering acute depression—a "dark time," with suicidal thoughts—between ages 25 and 28. It was a "terrible place," she said, but it formed a foundation that allowed her "to come back stronger" (McLaughlin, 2010).

Today's psychologists continue to sleuth why people have depressive disorders and bipolar disorder, and to design more effective ways to treat and prevent them. Here, we focus primarily on depressive disorders. One research group summarized the facts that any theory of depression must explain, including the following (Lewinsohn et al., 1985, 1998, 2003):

- ***Behavioral and cognitive changes accompany depression.*** People trapped in a depressed mood become inactive and feel alone, empty, and without a bright or meaningful future (Bullock & Murray, 2014; Khazanov & Ruscio, 2016; Smith & Rhodes, 2014). They avoid positive information and attend selectively to negative events (Peckham et al., 2010; Winer & Salem, 2016). They more often recall negative information. They expect negative outcomes (my team will lose, my grades will fall, my love will fail). When the depression lifts, these behavioral and cognitive accompaniments disappear. Nearly half the time, people also exhibit symptoms of another disorder, such as anxiety or substance abuse.

- ***Depression is widespread.*** Worldwide, 350 million people have major depressive disorder and 60 million people have bipolar disorder (WHO, 2017a). At some point during their lifetime, depression has plagued 11 percent of Canadian 15- to 24-year-olds (Findlay, 2017). Depression's commonality suggests that its causes, too, must be common.
- ***Women's risk of major depressive disorder is nearly double men's.*** In 2009, when Gallup pollsters asked more than a quarter-million Americans if they had ever been diagnosed with depression, 13 percent of men and 22 percent of women said they had (Pelham, 2009). When Gallup asked Americans if they had experienced sadness "during a lot of the day yesterday," 17 percent of men and 28 percent of women answered *Yes* (Mendes & McGeeney, 2012). The depression gender gap —with U.S. women experiencing depression 1.7 times more often than men (CDC, 2014a)—has been found worldwide (**Figure 67.1**). The trend begins in adolescence; preadolescent girls are not more depression-prone than are boys (Kuehner, 2017). After reaching puberty, girls also become more vulnerable than boys to eating disorders, self-injury, and anxiety (Mendle et al., 2016). Menopause—more specifically, "the 5 or 6 years surrounding the last menstrual period"—is also a time of women's increased depression risk, though in later life, the depression gender gap diminishes (Gordon et al., 2016; Patten et al., 2016).

  The factors that put women at risk for depression (genetic predispositions, child abuse, low self-esteem, marital problems, and so forth) similarly put men at risk (Kendler et al., 2006). Yet women are more vulnerable to disorders involving internalized states such as depression, anxiety, and inhibited sexual desire. Women experience more situations that increase their risk for depression, such as receiving less pay for equal work, juggling multiple roles, and caring for children and elderly family members (Freeman & Freeman, 2013). Men’s disorders tend to be more external—alcohol use disorder, and disorders related to antisocial conduct and lack of impulse control. When women get sad, they often get sadder than men do. When men get mad, they often get madder than women do.

- ***Most major depressive episodes self-terminate.*** Therapy often helps and tends to speed recovery. But even without professional help, most people recover from depression and return to normal. The plague of depression comes and, a few weeks or months later, it goes, though for some (about half), it eventually returns (Curry et al., 2011; Klein & Kotov, 2016). Only about 20 percent experience chronic depression (Klein, 2010). On average, a person with major depressive disorder today will spend about three-fourths of the next decade in a normal, nondepressed state (Furukawa et al., 2009). In one study of over 20,000 Canadians, an enduring recovery was more likely if the first episode struck later in life, there was no prior history of depression, people experienced minimal physical or psychological stress, and they had ample social support (Fuller-Thomson et al., 2016).
- ***Stressful events related to work, marriage, and close relationships often precede depression.*** As anxiety is a response to the threat of future loss, depression is often a response to past and current stress. Experiencing childhood abuse doubles a person’s risk of adult depression (Nelson et al., 2017). About 1 person in 4 diagnosed with depression has been brought down by a significant loss or trauma, such as a loved one’s death, a ruptured marriage, a physical assault, or a lost job (Kendler et al., 2008; Monroe & Reid, 2009; Orth et al., 2009; Wakefield et al., 2007). Moving to a new culture also increases risk for depression, especially among younger people who have not yet formed their identities (Zhang et al., 2013). One long-term study (Kendler, 1998) tracked rates of depression in 2000 people. The risk of depression ranged from less than 1 percent among those who had experienced no stressful life event in the preceding month to 24 percent among those who had experienced three such events in that month. For some,

grappling with life’s minor daily stressors can also negatively impact mental health. People who overreacted to minor stressors, such as a broken appliance, were more often depressed 10 years later (Charles et al., 2013).

- ***Compared to generations past, depression strikes earlier (now often in the late teens) and affects more people, with the highest rates among young adults in developed countries.*** Although adolescent depression rates have recently leveled off, this trend has been reported in Canada, the United States, England, France, Germany, Italy, Lebanon, New Zealand, Puerto Rico, and Taiwan (Cross-National Collaborative Group, 1992; Kessler et al., 2010; Olfson et al., 2015). In one study, 12 percent of Australian adolescents reported symptoms of depression (Sawyer et al., 2000). Most hid it from their parents, almost 90 percent of whom perceived their depressed teen as *not* suffering depression. In North America, young adults are three times more likely than their grandparents to report having recently—or ever—suffered depression (despite the grandparents’ many more years of being at risk). The increase may reflect a cultural difference of today’s young adults’ greater willingness to disclose depression.

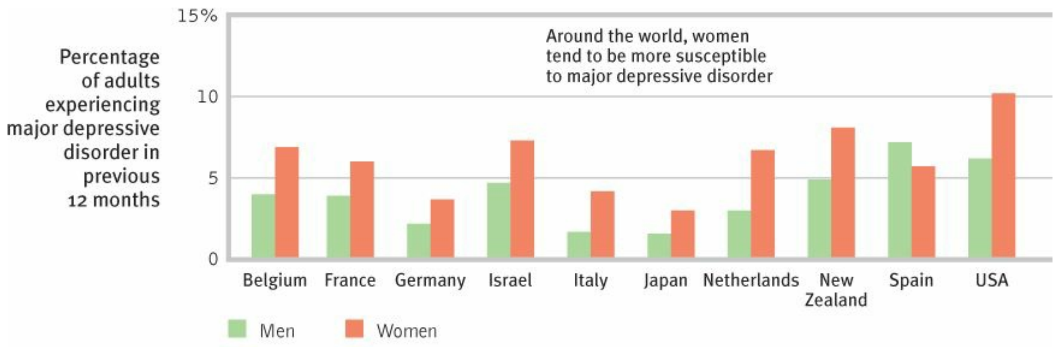


Figure 67.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Bromet et al., 2011.

Figure 67.1 Gender and major depressive disorder

Interviews with 89,037 adults in 18 countries (10 of which are shown here) confirm what many smaller studies have found: Women’s risk of major depressive disorder is nearly double men’s.

Armed with these facts, today’s researchers propose biological and cognitive explanations of depression, often combined in a biopsychosocial perspective.

The Biological Perspective

Depression is a whole-body disorder. It involves genetic predispositions and biochemical imbalances, as well as negative thoughts and a gloomy mood.

Genetic Influences

Depressive disorders and bipolar disorder run in families. As one researcher noted, emotions are “postcards from our genes” (Plotkin, 1994). The risk of being diagnosed with one of these disorders increases if your parent or sibling has the disorder (Sullivan et al., 2000; Weissman et al., 2016). If one identical twin is diagnosed with major depressive disorder, the chances are about 1 in 2 that at some time the other twin will be, too. If one identical twin has bipolar disorder, the chances of a similar diagnosis for the co-twin are even higher—7 in 10—even for twins raised apart (DiLalla et al., 1996). Summarizing the major twin studies, one research team estimated the heritability of major depressive disorder—the extent to which individual differences are attributable to genes—at 40 percent (Polderman et al., 2015; see also **Figure 67.2** for another study’s similar heritability findings for this and other disorders).

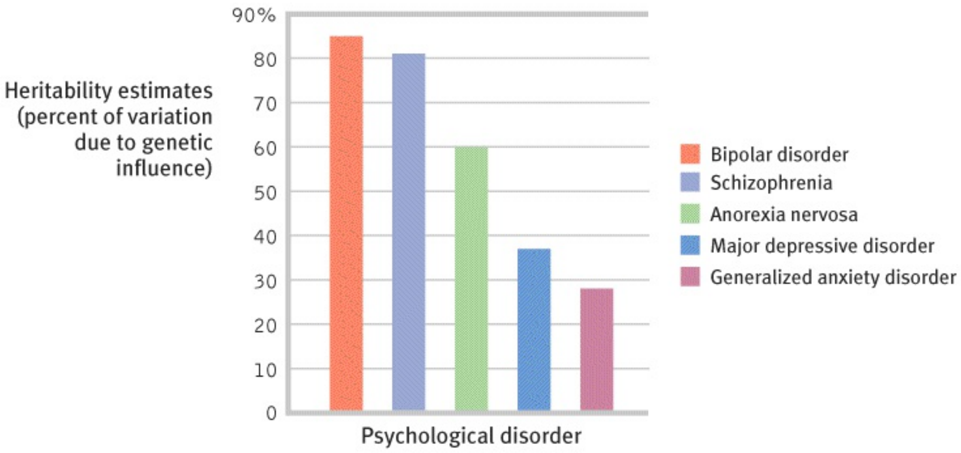


Figure 67.2

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Figure 67.2 The heritability of various psychological disorders

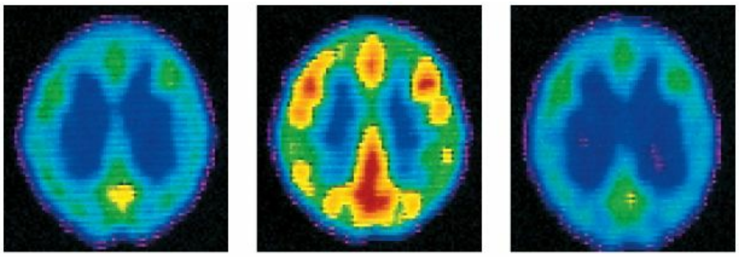
Using aggregated data from studies of identical and fraternal twins, researchers estimated the heritability of bipolar disorder, schizophrenia, anorexia nervosa, major depressive disorder, and generalized anxiety disorder (Bienvenu et al., 2011). (Heritability was calculated by a formula that compares the extent of similarity among identical versus fraternal twins.)

To tease out the genes that put people at risk for depression, some researchers have turned to *linkage analysis*. First, geneticists find families in which the disorder appears across several generations. Next, the researchers examine DNA from affected and unaffected family members, looking for differences. Linkage analysis points them to a chromosome neighborhood; "A house-to-house search is then needed to find the culprit gene" (Plomin & McGuffin, 2003). But depression is a complex condition. Many genes work together, producing a mosaic of small effects that interact with other factors to put some people at greater risk. Researchers continue to identify culprit gene variations that may open the door to more effective drug therapy (Hyde et al., 2016; Power et al., 2017).

The Depressed Brain

Scanning devices let us eavesdrop on the brain's activity during depressed and manic states. One study gave 13 elite Canadian swimmers the wrenching experience of watching a video of the swim in which they failed to make the Olympic team or failed at the Olympic games (Davis et al., 2008). Functional MRI scans showed the disappointed swimmers experiencing brain activity patterns similar to those of people with depressed moods.

Many studies have found diminished brain activity during slowed-down depressive states, and more activity during periods of mania (**Figure 67.3**). Depression can cause the brain's reward centers to become less active (Miller et al., 2015; Stringaris et al., 2015). During positive emotions, the left frontal lobe and an adjacent reward center become more active (Davidson et al., 2002; Robinson et al., 2012).



Depressed state (May 17)

Manic state (May 18)

Depressed state (May 27)

Figure 67.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Courtesy of Drs. Lewis Baxter and Michael E. Phelps, UCLA School of Medicine

Figure 67.3 The ups and downs of bipolar disorder

These top-facing PET scans show that brain energy consumption rises and falls with the patient's emotional switches. Red areas are where the brain rapidly consumes glucose.

Neuroscientists have also discovered altered brain structures in people with bipolar disorder. These studies discovered a decrease in myelinated axons (see Module 9) and enlarged fluid-filled ventricles (Arnone et al., 2009; Hibar et al., 2016).

Neurotransmitter systems also influence depressive disorders and bipolar disorder. *Norepinephrine*, which increases arousal and boosts mood, is scarce during depression and overabundant during mania. Drugs that decrease mania reduce norepinephrine.

Serotonin is also scarce or inactive during depression (Carver et al., 2008). One well-publicized study of New Zealand young adults found that the recipe for depression combined two necessary ingredients—significant life stress plus a variation of a serotonin-controlling gene (Caspi et al., 2003; Moffitt et al., 2006). Depression arose from the combination of an adverse environment plus a genetic susceptibility, but not from either alone. But stay tuned: The story of gene-environment interactions is still being written, as other researchers debate the reliability of this result (Culverhouse et al., 2013; Karg et al., 2011).

AP® EXAM TIP

This is a good time to review Unit III. Consider how the use of brain scans (such as the MRI and PET) and knowledge about neurotransmitters (such as norepinephrine and serotonin) have helped us understand depression and mania.

Drugs that relieve depression tend to increase norepinephrine or serotonin supplies by blocking either their reuptake (as Prozac, Zoloft, and Paxil do with serotonin) or their chemical breakdown. Repetitive physical exercise, such as jogging, reduces depression in part because it increases serotonin, which affects mood and arousal (Airan et al., 2007; Ilardi, 2009; Jacobs, 1994). In one study, running for two hours increased brain activation in regions associated with euphoria (Boecker et al., 2008). To run away from a bad mood, you can use your own two feet.

Nutritional Effects

What's good for the heart is also good for the brain and mind. People who eat a heart-healthy "Mediterranean diet" (heavy on vegetables, fish, and olive oil) have a comparatively low risk of developing heart disease, stroke, late-life cognitive decline, and depression—all of which are associated with inflammation (Kaplan et al., 2015; Psaltopoulou et al., 2013; Rechenberg, 2016). Excessive alcohol use also correlates with depression, partly because depression can increase alcohol use but mostly because alcohol misuse *leads* to depression (Fergusson et al., 2009).

FYI

Microbes and the mind: Digestive system bacteria produce neurotransmitters that influence human emotions and social interactions (Dinan et al., 2015; Kaplan et al., 2015; Nowakowski et al., 2016).

The Social-Cognitive Perspective

Biological influences contribute to depression, but in the nature–nurture dance, our life experiences also play a part. Diet, drugs, stress, and other environmental influences lay down *epigenetic marks*, molecular genetic tags that can turn certain genes on or off. Animal studies suggest that long-lasting epigenetic influences may play a role in depression (Nestler, 2011).

Thinking matters, too. The *social-cognitive perspective* explores how people's assumptions and expectations influence what they perceive. Many depressed people view life through the dark glasses of low self-esteem (Orth et al., 2016). Their intensely negative assumptions about themselves, their situation, and their future lead them to magnify bad experiences and minimize good ones (Wenze et al., 2012). Listen to Norman, a Canadian university professor, recalling his depression:

> I [despaired] of ever being human again. I honestly felt subhuman, lower than the lowest vermin. Furthermore, I was self-deprecatory and could not understand why anyone would want to associate with me, let alone love me. . . . I was positive that I was a fraud and a phony and that I didn't deserve my Ph.D. . . . I didn't deserve the research grants I had been awarded; I couldn't understand how I had written books and journal articles. . . . I must have conned a lot of people. (Endler, 1982, pp. 45–49)

Expecting the worst, depressed people's *self-defeating beliefs* and their *negative explanatory style* feed their depression.

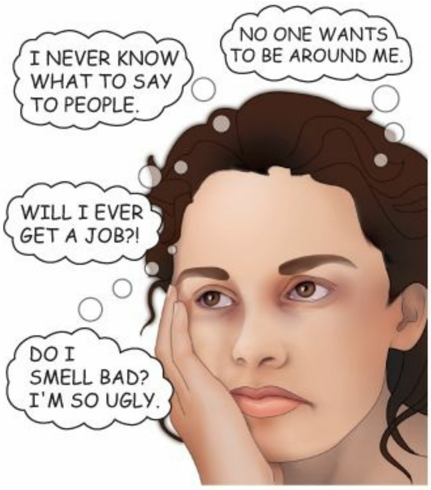
Negative Thoughts, Negative Moods, and Gender

Women may respond more strongly to stress (Hankin & Abramson, 2001; Mazure et al., 2002; Nolen-Hoeksema, 2001, 2003). For example, 38 percent of women and 17 percent of men entering American colleges and universities have reported feeling at least occasionally "overwhelmed by all I have to do" (Pryor et al., 2006). Relationship stresses also affect teen girls more than boys (Hamilton et al., 2015).

This gender stress difference may help explain why, beginning in their early teens, women have been nearly twice as vulnerable to depression. Susan Nolen-Hoeksema (2003) related women's higher risk of depression to what she described as their tendency to ruminate or *overthink*. Staying focused on a problem (thanks to the continuous firing of a frontal lobe area that sustains attention)—can be adaptive (Altamirano et al., 2010; Andrews & Thomson, 2009a,b). But relentless, self-focused **rumination** can distract us, increase negative emotion, and disrupt daily activities (Johnson et al., 2016; Kircanski et al., 2015; Yang et al., 2017). Comparisons can also feed misery. While Josh is happily playing video games, lonely Lauren scrolls through her social media feed and sees Maria having a blast with friends, Angelique enjoying a family vacation, and Tyra looking super in a swimsuit. In response, Lauren broods: “My life is terrible.”

rumination

compulsive fretting; *overthinking* our problems and their causes.


I NEVER KNOW WHAT TO SAY TO PEOPLE.
NO ONE WANTS TO BE AROUND ME.
WILL I EVER GET A JOB?!
DO I SMELL BAD? I'M SO UGLY.

Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Rumination runs wild It’s normal to think about our flaws. But dwelling constantly on negative thoughts—particularly negative thoughts about ourselves—makes it difficult to believe in ourselves and solve problems. People sometimes seek therapy to reduce their rumination.

Even so, why do life’s unavoidable failures lead only some people to become depressed? The answer lies partly in their *explanatory style*—who or what they blame for their failures. Think of how you might feel if you failed a test. If you can externalize the blame (“What an unfair test!”), you are more likely to feel angry. If you blame yourself, you probably will feel stupid and depressed.

> “ *I think I, like a lot of people, have that type of brain where I find it interesting or*

> *fulfilling to worry about something.*”
>
> *Comedian Maria Bamford*

So it is with depressed people, who often explain bad events in terms that are *stable* (“It’s going to last forever”), *global* (“It’s going to affect everything I do”), and *internal* (“It’s all my fault”) (**Figure 67.4**). Depression-prone people respond to bad events in an especially self-focused, self-blaming way (Huang, 2015; Mor & Winquist, 2002; Wood et al., 1990a,b). When they describe themselves, their brains show extra activity in a region that processes self-relevant information (Sarsam et al., 2013). Their self-esteem is also more plastic—it climbs with praise and plummets with threats (Butler et al., 1994).

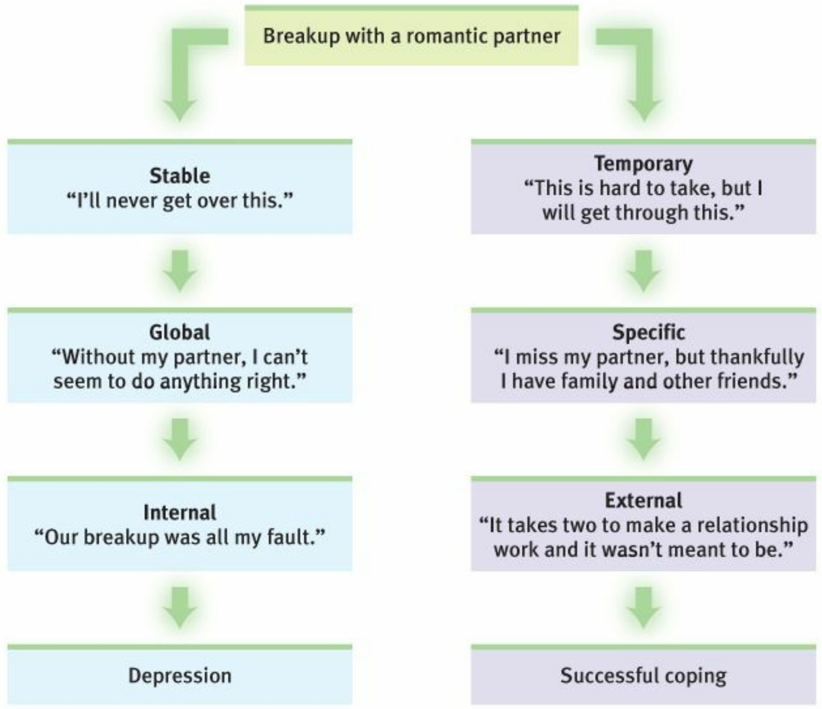

Breakup with a romantic partner
Stable
“I’ll never get over this.”
Temporary
“This is hard to take, but I will get through this.”
Global
“Without my partner, I can’t seem to do anything right.”
Specific
“I miss my partner, but thankfully I have family and other friends.”
Internal
“Our breakup was all my fault.”
External
“It takes two to make a relationship work and it wasn’t meant to be.”
Depression
Successful coping

Figure 67.4
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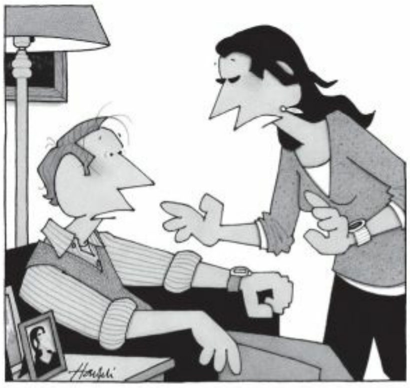
Figure 67.4 Explanatory style and depression

After a difficult experience, a depression-prone person may respond with a negative explanatory style.

Self-defeating beliefs may arise from *learned helplessness*, the hopelessness and passive resignation humans and other animals learn when they experience uncontrollable painful events (Maier & Seligman, 2016) (see Module 29). Pessimistic, overgeneralized, self-blaming attributions may create a depressing sense of hopelessness (Abramson et al., 1989; Panzarella et al., 2006). As Martin Seligman has noted, “A recipe for severe depression is preexisting pessimism encountering failure” (1991, p. 78). What then might we expect of new college students who exhibit a pessimistic explanatory style? Lauren Alloy and her colleagues (1999) monitored several hundred students every 6 weeks for 2.5 years. Among those identified as having a pessimistic thinking style, 17 percent had a first episode of major depression, as did only 1 percent of those who began college with an optimistic thinking style.

Why is depression so common among young Westerners? Seligman (1991, 1995) pointed to the rise of individualism and the decline of commitment to religion and family. In non-Western cultures, where close-knit relationships and cooperation are the norm, major depressive disorder is less common and less tied to self-blame over personal failure (Ferrari et al., 2013; WHO, 2004a). In Japan, for example, depressed people instead tend to report feeling shame over letting others down (Draguns, 1990a).

Critics note a chicken-and-egg problem nesting in the social-cognitive explanation of depression. Which comes first—the pessimistic explanatory style or the depressed mood? The negative explanations *coincide* with a depressed mood, and they are *indicators* of depression. (Before or after being depressed, people’s thoughts are less negative. Perhaps a depressed mood triggers negative thoughts.) But do negative thoughts *cause* depression, any more than a speedometer’s reading *causes* a car’s speed? If you temporarily put people in a bad or sad mood, their memories, judgments, and expectations suddenly become more pessimistic. Memory researchers call this tendency to recall experiences that fit our current good or bad mood *state-dependent memory* (Module 32).



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“You should never engage in unsupervised introspection.”

Depression’s Vicious Cycle

Depression is both a cause and an effect of stressful experiences that disrupt our sense of who we are and why we are worthy human beings. Such disruptions can lead to brooding, which amplifies negative feelings. Being withdrawn, self-focused, and complaining can in turn elicit rejection (Furr & Funder, 1998; Gotlib & Hammen, 1992). Indeed, people in the throes of depression are at high risk for divorce, job loss, and other stressful life events. Weary of the person’s fatigue, hopeless attitude, and negativity, a spouse may threaten to leave or a boss may begin to question the person’s competence. (This provides another example of genetic-environmental interaction: People genetically predisposed to depression more often experience depressing events.) Rejection and depression feed each other. Misery may love another’s company, but company does not love another’s misery.

> “*Man never reasons so much and becomes so introspective as when he suffers, since he is anxious to get at the cause of his sufferings.*”
>
> *Luigi Pirandello,* Six Characters in Search of an Author, *1922*

We can now assemble some of the pieces of the depression puzzle (**Figure 67.5**): (1) Stressful experiences interpreted through (2) a ruminating, pessimistic explanatory style create (3) a hopeless, depressed state that (4) hampers the way the person thinks and acts. This, in turn, fuels (1) further stressful experiences such as rejection. Depression is a snake that bites its own tail.

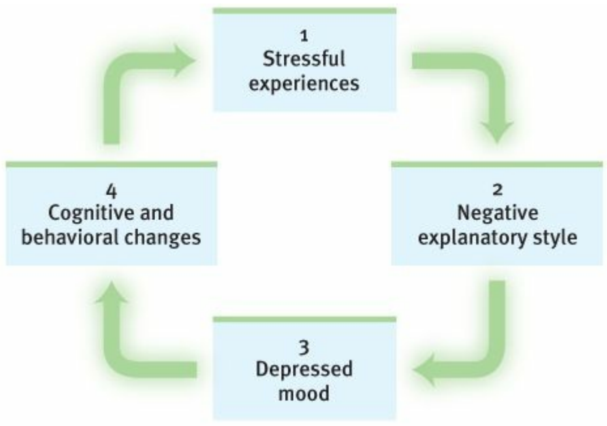

Figure 67.5
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Figure 67.5 The vicious cycle of depressed thinking

Therapists recognize this cycle, and they work to help depressed people break out of it by changing their negative thinking, turning their attention outward, and engaging them in more pleasant and competent behavior.

None of us are immune to the dejection, diminished self-esteem, and negative thinking brought on by rejection or defeat. Even small losses can temporarily sour our thinking. In one study, researchers studied some avid Indiana University basketball fans who seemed to regard the team as an extension of themselves (Hirt et al., 1992). After the fans watched their team lose or win, the researchers asked them to predict the team's future performance and their own. After a loss, the morose fans offered bleaker assessments not only of the team's future but also of their own likely performance at throwing darts, solving anagrams, and getting a date. When things aren't going our way, it may seem as though they never will.

> “*Some cause happiness wherever they go; others, whenever they go.*”
>
> *Irish writer Oscar Wilde (1854–1900)*

It is a cycle we can all recognize. Bad moods feed on themselves: When we feel down, we think negatively and remember bad experiences. Britain's Prime Minister Winston Churchill called depression a "black dog" that periodically hounded him. Abraham Lincoln was so withdrawn and brooding as a young man that his friends feared he might take his own life (Kline, 1974). Poet Emily Dickinson was so afraid of bursting into tears in public that she spent much of her adult life in seclusion (Patterson, 1951). As their lives remind us, people can and do struggle through depression. Most regain their capacity to love, to work, and even to succeed at the highest levels.

Suicide and Self-Injury

67-3 What factors increase the risk of suicide, and what do we know about nonsuicidal self-injury?

Each year over 800,000 despairing people worldwide will elect a permanent solution to what might have been a temporary problem (WHO, 2014b). For those who have been anxious, the risk of suicide is tripled, and for those who have been depressed, the risk is quintupled (Bostwick & Pankratz, 2000; Kanwar et al., 2013). People seldom commit suicide while in the depths of depression, when energy and initiative are lacking. The risk increases when they begin to rebound and become capable of following through (Chu et al., 2016).

Comparing the suicide rates of different groups, researchers have found

- ***national differences:*** In Britain, Italy, and Spain, suicide rates have been little more than half those of Canada, Australia, and the United States. Austria's and Finland's are about double (WHO, 2011). Within Europe, people in the most suicide-prone country (Belarus) have been 16 times more likely to kill themselves than those in the least (Georgia).
- ***racial differences:*** Within the United States, Whites and Native Americans kill themselves twice as often as Blacks, Hispanics, and Asians (CDC, 2012).
- ***gender differences:*** Women are much more likely than men to *attempt* suicide (WHO, 2011). But men are two to four times more likely (depending on the country) to actually end their lives. Men use more lethal methods, such as firing a bullet into the head, the method of choice in 6 of 10 U.S. suicides.
- ***age differences:*** In late adulthood, rates increase, with the highest rate among 45- to 64-year-olds and the second-highest among those 85 and older (AFSP, 2015).
- ***other group differences:*** Suicide rates have been much higher among

the rich, the nonreligious, and those single, widowed, or divorced (Hoyer & Lund, 1993; Norko et al., 2017; Okada & Samreth, 2013; VanderWeele et al., 2016, 2017). Witnessing physical pain and trauma can increase the risk of suicide, which may help explain veterans' and physicians' elevated suicide rates (Bender et al., 2012; Cornette et al., 2009). Gay, transgender, and gender nonconforming youth facing an unsupportive environment, including family or peer rejection, are also at increased risk of attempting suicide (Goldfried, 2001; Haas et al., 2011; Hatzenbuehler, 2011; Testa et al., 2017). Among people with alcohol use disorder, 3 percent die by suicide. This rate is roughly 100 times greater than the rate for people without alcohol use disorder (Murphy & Wetzel, 1990; Sher, 2006).

- ***day of the week and seasonal differences:*** Negative emotion tends to go up midweek, which can have tragic consequences (Watson, 2000). A surprising 25 percent of U.S. suicides occur on Wednesdays (Kposowa & D'Auria, 2009). Suicide rates are highest in April and May, and not (as commonly believed) over the winter holidays (Nock, 2016).

Social suggestion may trigger suicide. Following highly publicized suicides and TV programs featuring suicide, known suicides increase. So do fatal auto and private airplane "accidents." One six-year study tracked suicide cases among all 1.2 million people who lived in metropolitan Stockholm at any time during the 1990s (Hedström et al., 2008). Men exposed to a family suicide were 8 times more likely to commit suicide than were nonexposed men. That phenomenon may be partly attributable to family genes. But shared genetic predispositions cannot explain why men exposed to a co-worker's suicide were 3.5 times more likely to commit suicide compared with nonexposed men.

Suicide is not necessarily an act of hostility or revenge. People—especially older adults—may choose death as an alternative to current or future suffering, a way to switch off unendurable pain and relieve a perceived burden on family members. Suicidal urges typically arise when people feel disconnected from others and a burden to them, or when they feel defeated and trapped by an inescapable situation (Joiner, 2010; Taylor et al., 2011). Thus, suicide rates increase with unemployment during economic recessions (DeFina & Hannon, 2015; Reeves et al., 2014). Suicidal thoughts also may increase when people are driven to reach a goal or standard—to become thin or straight or rich—and find it unattainable (Chatard & Selimbegovic´, 2011).

In hindsight, families and friends may recall signs they believe should have forewarned them—verbal hints, giving possessions away, or withdrawal and preoccupation with death. To judge from surveys of 84,850 people across 17 nations, about 9 percent of people at some point in their lives have thought seriously of suicide. About 3 in 10 of those who think about it will actually attempt suicide (Nock et al., 2008). Only 3 percent of Americans die in that attempt (Han et al., 2016). In one study that followed people for up to 25 years after a first suicide attempt, some 5 percent died by suicide (Bostwick et al., 2016). One group of clinical psychologists summarized 50 years of research on suicide’s unpredictability: “The vast majority of people who possess a specific risk factor [for suicide] will never engage in suicidal behavior” (Franklin et al., 2017, p. 217).

But researchers continue to try to solve the suicide puzzle. Although most suicide attempts fail, the risk of death by suicide is seven times greater among those who have previously attempted suicide (Al-Sayegh et al., 2015). Each year, about 40,000 Americans will kill themselves—about two-thirds using guns. (Drug overdoses account for about 80 percent of suicide attempts, but only 14 percent of suicide fatalities.) States with high gun ownership are states with high suicide rates, even after controlling for poverty and urbanization (Miller et al., 2002, 2016; Tavernise, 2013). After Missouri repealed its tough handgun law, its suicide rate went up 15 percent; when Connecticut enacted such a law, its suicide rate dropped 16 percent (Crifasi et al., 2015). Thus, although U.S. gun owners often keep a gun to feel safer, having a gun in the home makes one less safe, because it substantially *increases* the odds of a family member dying by suicide or homicide (Kposowa et al., 2016; VPC, 2015; Vyse, 2016).

FYI

Does a full moon trigger “madness” in some people? James Rotton and I. W. Kelly (1985) examined data from 37 studies that related lunar phase to crime, homicides, crisis calls, and psychiatric hospital admissions. Their conclusion: There is virtually no evidence of “moon madness.” Nor does lunar phase correlate with suicides, assaults, emergency room visits, or traffic disasters (Martin et al., 1992; Raison et al., 1999).

How can we be helpful to someone who is talking suicide—who says, for example, “I wish I could just end it all” or “I hate my life; I can’t go on”? If people write such things online, you can anonymously contact the safety teams at various social media websites (including Facebook, Twitter, Instagram, YouTube, and Tumblr). If a friend or family member talks suicide, you can

1. listen and empathize;
2. *connect* the person with your school psychologist or counselor, with (in the United States) the Suicide Prevention Lifeline (1-800-273-TALK) or Crisis Text Line (by texting HOME to 741741), or with their counterparts in other countries (such as the LifeLine App in Canada); and
3. *protect* someone who appears at risk by seeking help from a trusted adult—a parent, a teacher, a school nurse or school counselor—or calling 911. Better to share a secret than to attend a funeral.

> “ *People desire death when two fundamental needs are frustrated to the point of extinction: The need to belong with or connect to others, and the need to feel effective with or to influence others.* ”
>
> *Thomas Joiner (2006, p. 47)*

Nonsuicidal Self-Injury

Self-harm takes many forms. Some people may engage in *nonsuicidal self-injury (NSSI)*, which is more common in adolescence and among females (CDC, 2009) (**Figure 67.6**). Such behavior, though painful, is not fatal. Those who engage in NSSI may cut or burn their skin, hit themselves, insert objects under their nails or skin, or self-administer tattoos. People who engage in NSSI tend to experience bullying, harassment, and other life stress (Liu et al., 2016; van Geel et al., 2015). They are generally less able to tolerate and regulate emotional distress (Hamza et al., 2015). They are often extremely self-critical and struggle to communicate, solve problems, and perform academically (Kiekens et al., 2016; Nock, 2010; You et al., 2015). Why do they hurt themselves? Reinforcement processes are at work (Bentley et al., 2014). Through NSSI they may

- find relief from intense negative thoughts through the distraction of pain.
- attract attention and possibly get help.
- relieve guilt by punishing themselves.
- get others to change their negative behavior (bullying, criticism).
- fit in with a peer group.

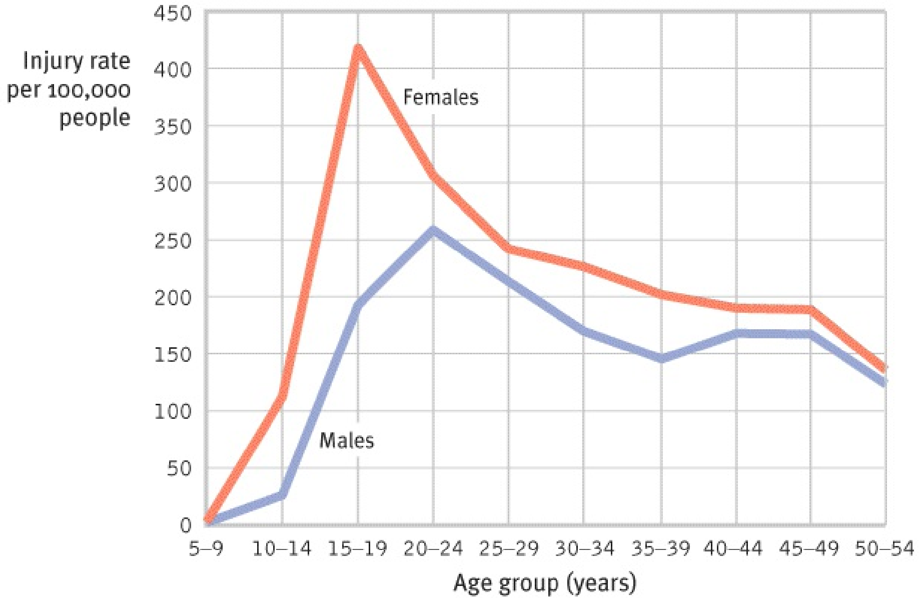


Figure 67.6
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from CDC, 2009.

Figure 67.6 Rates of nonfatal self-injury in the United States

Self-injury rates peak higher for females than for males.

Does NSSI lead to suicide? Usually not. Those who engage in NSSI are typically suicide gesturers, not suicide attempters (Nock & Kessler, 2006). Nevertheless, NSSI is a risk factor for suicidal thoughts and future suicide attempts, especially when coexisting with bipolar disorder (Hawton et al., 2015; Runeson et al., 2016; Willoughby et al., 2015). If people do not find help, their nonsuicidal behavior may escalate to suicidal thoughts and, finally, to suicide attempts.

✓ Check Your Understanding

Ask Yourself

- Has your high school experience been a challenging time for you? What advice would you have for other students about to enter high school?

Test Yourself

- What does it mean to say that “depression is a whole-body disorder”?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 67 REVIEW

67-1 How do major depressive disorder, persistent depressive disorder, and bipolar disorder differ?

- A person with *major depressive disorder* experiences at least five symptoms of depression (including either depressed mood or loss of interest or pleasure) for two or more weeks.
- A person with persistent depressive disorder experiences a mildly depressed mood more often than not for at least two years, as well as at least two symptoms of depression.
- A person with the less common condition of *bipolar disorder* experiences not only depression but also *mania*—episodes of hyperactive and wildly optimistic, impulsive behavior.

67-2 How can the biological and social-cognitive perspectives help us understand depressive disorders and bipolar disorder?

- The biological perspective on depression focuses on genetic predispositions and on abnormalities in brain structures and function (including those found in neurotransmitter systems).
- The social-cognitive perspective views depression as an ongoing cycle of stressful experiences (interpreted through negative beliefs, attributions, and memories, and intensified by *rumination*) leading to negative moods and actions and fueling new stressful experiences.
- Both biology and environment contribute to epigenetic effects, which may play a role in depression.

67-3 What factors increase the risk of suicide, and what do we know about nonsuicidal self-injury?

- Suicide rates differ by nation, race, gender, age group, income, religious involvement, marital status, and other factors. Gay, transgender, and gender nonconforming youth lacking social support are at increased risk, as are people who have been anxious or depressed.

- Day of the week, season, or social suggestion may play a role in suicide risk.
- Personal trauma, disconnection, or defeat can contribute to suicidal urges.
- Forewarnings of suicide may include verbal hints, giving away possessions, withdrawal, preoccupation with death, and discussing one's own suicide.
- Nonsuicidal self-injury (NSSI) does not usually lead to suicide but may escalate to suicidal thoughts and acts if untreated.
- People who engage in NSSI do not tolerate stress well and tend to be self-critical, with poor communication and problem-solving skills.

Multiple-Choice Questions

1. After spending several weeks barely able to get out of bed, Hatch finds himself with so much energy that he surprises his wife by painting the entire house in one day. Concerned, his wife brings him to the hospital, where the doctors diagnose him with

a. suicidal thoughts.
b. bipolar disorder.
c. persistent depressive disorder.
d. rumination.
e. major depressive disorder.

2. Which of the following is true of depression?

a. Depression usually develops during middle age.
b. Depression usually happens without major cognitive or behavioral changes.
c. A major depressive episode usually gets worse and worse unless it's treated.

d. True depression is usually not related to stress in one’s work or relationships.
e. Compared with men, nearly twice as many women have been diagnosed with depression.

3. Concerning suicide,

a. marijuana use is related to suicide, but alcohol use is not.
b. women are more likely to attempt suicide than men.
c. suicide is a bigger problem among the poor than among the rich.
d. women are more likely to end their lives than men.
e. married individuals are more likely to commit suicide than single people.

4. Based on brain scans of those with bipolar disorder, which of the following is true?

a. The brain is more active during manic episodes and less active during depressive episodes.
b. The brain is less active during manic episodes and more active during depressive episodes.
c. There is no consistent relationship between brain activity and periods of mania or depression.
d. The brain is more active than normal during both manic and depressive episodes.
e. The brain is less active than normal during both manic and depressive episodes.

5. During depression, researchers have found

I. reduced levels of serotonin.
II. reduced levels of norepinephrine.
III. reduced activity in the hypothalamus.

a. I only.
b. II only.
c. III only.
d. I & II only.

e. I & III only.

Practice FRQs

1. Depression is often misunderstood as “sad” and mania is often misunderstood as “happy.” Provide two examples for each of these disordered behaviors that could help clarify this misunderstanding.

Answer

2 points: Depression examples could include any two behaviors that illustrate the following: a lack of interest in activities, feelings of hopelessness, reduced energy levels, problems with sleep, and problems with appetite. Page 687

2 points: Mania examples could include any two behaviors that illustrate the following: little need for sleep, wildly increased energy levels, dangerous risk-taking, and extreme optimism. Page 687

2. Marty was dumped by his girlfriend and has developed depression. Explain Marty’s thinking about his situation using the following terms:

- Learned helplessness
- Rumination

(2 points)

Module **68 Schizophrenia**

LEARNING TARGETS

- 68-1 Describe the patterns of perceiving, thinking, and feeling that characterize schizophrenia.
- 68-2 Contrast chronic schizophrenia and acute schizophrenia.
- 68-3 Discuss the brain abnormalities associated with schizophrenia.
- 68-4 Discuss the prenatal events associated with increased risk of developing schizophrenia.
- 68-5 Discuss how genes influence schizophrenia, and identify the factors that may be early warning signs of schizophrenia in children.

During their most severe periods, people with **schizophrenia** live in a private inner world, preoccupied with the strange ideas and images that haunt them. The word itself means “split” (*schizo*) “mind” (*phrenia*). It refers *not* to a multiple personality split but rather to the mind’s split from reality. People with schizophrenia have disturbed perceptions and beliefs, disorganized speech, and diminished, inappropriate emotions (and actions). Schizophrenia is the chief example of a **psychotic disorder**, a group of disorders marked by irrationality, distorted perceptions, and lost contact with reality.

schizophrenia

a disorder characterized by delusions, hallucinations, disorganized speech, and/or diminished, inappropriate emotional expression.

psychotic disorders

a group of disorders marked by irrational ideas, distorted perceptions, and a loss of contact with reality.

Symptoms of Schizophrenia

Flip It Video: Positive and Negative Symptoms of Schizophrenia

68-1 What patterns of perceiving, thinking, and feeling characterize schizophrenia?

Schizophrenia comes in varied forms. People with schizophrenia display symptoms that are *positive* (*inappropriate* behaviors are *present*) or negative (*appropriate* behaviors are *absent*). Those with *positive* symptoms may experience hallucinations, talk in disorganized and deluded ways, and exhibit inappropriate laughter, tears, or rage. Those with *negative* symptoms may exhibit an absence of emotion in their voices, expressionless faces, or unmoving—mute and rigid—bodies.

DISTURBED PERCEPTIONS AND BELIEFS People with schizophrenia sometimes have **hallucinations**—they see, feel, taste, or smell things that exist only in their minds. Most often, the hallucinations are voices, which sometimes make insulting remarks or give orders. The voices may tell the person that she is bad or that she must burn herself with a cigarette lighter. Imagine your own reaction if a dream broke into your waking consciousness, making it hard to separate your experience from your imagination. When the unreal seems real, the resulting perceptions are at best bizarre, at worst terrifying.

hallucinations

false sensory experiences, such as seeing something in the absence of an external visual stimulus.

Hallucinations are false *perceptions*. People with schizophrenia also have disorganized, fragmented thinking, often distorted by false *beliefs* called **delusions**. If they have *paranoid* tendencies, they may believe they are being threatened or pursued.

delusion

a false belief, often of persecution or grandeur, that may accompany psychotic disorders.

One cause of disorganized thinking may be a breakdown in *selective attention.* Recall from Module 16 that we normally we have a remarkable capacity to give our undivided attention to one set of sensory stimuli while filtering out others. People with schizophrenia are easily distracted by tiny unrelated stimuli, such as the grooves on a brick or tones in a voice. This selective attention difficulty is but one of dozens of cognitive differences associated with schizophrenia (Reichenberg & Harvey, 2007).

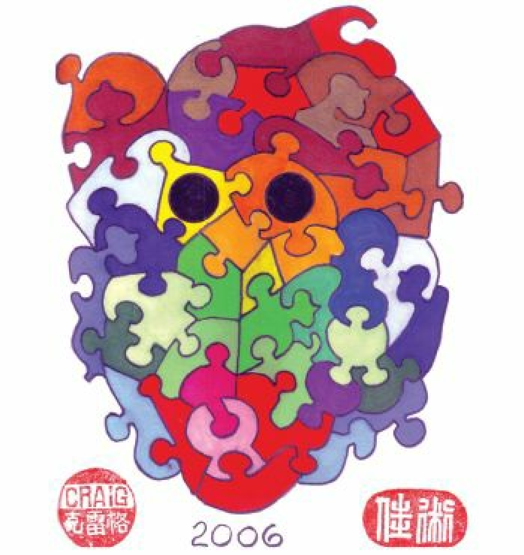
DISORGANIZED SPEECH Maxine, a young woman with schizophrenia, believed she was Mary Poppins. Communicating with Maxine was difficult because her thoughts spilled out in no logical order. Her biographer, Susan Sheehan (1982, p. 25), observed her saying aloud to no one in particular, “This morning, when I was at Hillside [Hospital], I was making a movie. I was surrounded by movie stars. . . . Is this room painted blue to get me upset? My grandmother died four weeks after my eighteenth birthday.”

Jumbled ideas may make no sense even within sentences, forming what is known as *word salad.* One young man begged for “a little more allegro in the treatment,” and suggested that “liberationary movement with a view to the widening of the horizon” will “ergo extort some wit in lectures.”

AP® EXAM TIP

When psychologists refer to “positive” and “negative” schizophrenia symptoms (as with positive and negative *reinforcement* in Unit VI), the terms *positive* and *negative* don’t mean “good” and “bad.” Symptoms are positive and negative in a mathematical sense (adding or subtracting behaviors).

DIMINISHED AND INAPPROPRIATE EMOTIONS The expressed emotions of schizophrenia are often utterly inappropriate, split off from reality (Kring & Caponigro, 2010). Maxine laughed after recalling her grandmother's death. On other occasions, she cried when others laughed, or became angry for no apparent reason. Others with schizophrenia lapse into an emotionless *flat affect* state of no apparent feeling. For example, monetary perks fail to provide the normal brain reward center activation (Radua et al., 2015). Most also have an *impaired theory of mind*—they have difficulty perceiving facial expressions and reading others' states of mind (Bora & Pantelis, 2016). Unable to understand others' mental states, those with schizophrenia struggle to feel sympathy and compassion (Bonfils et al., 2016). These emotional deficiencies occur early in the illness and have a genetic basis (Bora & Pantelis, 2013). Motor behavior may also be inappropriate and disruptive. Those with schizophrenia may experience *catatonia*, characterized by motor behaviors ranging from a physical stupor—remaining motionless for hours—to senseless, compulsive actions, such as continually rocking or rubbing an arm, to severe and dangerous agitation.



© Craig Geiser

Art by someone diagnosed with schizophrenia Commenting on the kind of artwork shown here (from Craig Geiser's 2010 art exhibit in Michigan), poet and art critic John Ashbery wrote: "The lure of the work is strong, but so is the terror of the unanswerable riddles it proposes."

AP® EXAM TIP

Be sure you can differentiate between hallucinations (false sensory experiences) and delusions (false beliefs).

As you can imagine, such disturbed perceptions and beliefs, disorganized speech, and out of place emotions profoundly disrupt social and work relationships. As with other disorders, many have sleep problems, which can increase night eating and obesity (Baglioni et al., 2016; Palmese et al., 2011). Given a supportive environment and medication, over 40 percent of people with schizophrenia will have periods of a year or more of normal life experience (Jobe & Harrow, 2010). But only 1 in 7 will have a full and enduring recovery (Jääskeläinen et al., 2013).

> “*Now consider this: The regulator that funnels certain information to you and filters out other information suddenly shuts off. Immediately, every sight, every sound, every smell coming at you carries equal weight; every thought, feeling, memory, and idea presents itself to you with an equally strong and demanding intensity.*”
>
> *Elyn R. Saks,* The Center Cannot Hold, *2007*

Onset and Development of Schizophrenia

68-2 How do chronic schizophrenia and acute schizophrenia differ?

This year, 1 in 100 people will join an estimated 21 million others worldwide who have schizophrenia (WHO, 2017a). This disorder knows no national boundaries, and it typically strikes as young people are maturing into adulthood. Men tend to be struck earlier, more severely, and more often (Aleman et al., 2003; Eranti et al., 2013; Picchioni & Murray, 2007).

When schizophrenia is a slow-developing process, called **chronic schizophrenia**, recovery is doubtful (Harrison et al., 2001; Jääskeläinen et al., 2013). This was the case with Maxine, whose schizophrenia took a slow course, emerging from a long history of social inadequacy and poor school performance (MacCabe et al., 2008). Social withdrawal, a negative symptom, is often found among those with chronic schizophrenia (Kirkpatrick et al., 2006). Men, whose schizophrenia develops on average four years earlier than women's, more often exhibit negative symptoms and chronic schizophrenia (Räsänen et al., 2000).

chronic schizophrenia

(also called *process schizophrenia*) a form of schizophrenia in which symptoms usually appear by late adolescence or early adulthood. As people age, psychotic episodes last longer and recovery periods shorten.

When previously well-adjusted people develop schizophrenia rapidly following particular life stresses, this is called **acute schizophrenia**, and recovery is much more likely. They more often have positive symptoms that respond to drug therapy (Fenton & McGlashan, 1991, 1994; Fowles, 1992).

acute schizophrenia

(also called *reactive schizophrenia*) a form of schizophrenia that can begin at any age; frequently occurs in response to a traumatic event.

Understanding Schizophrenia

Schizophrenia is one of the most heavily researched psychological disorders. Most studies now link it with abnormal brain tissue and genetic predispositions. Schizophrenia is a disease of the brain manifested in symptoms of the mind.

Brain Abnormalities

68-3 What brain abnormalities are associated with schizophrenia?

Might chemical imbalances in the brain underlie schizophrenia? Scientists have long known that strange behavior can have strange chemical causes. The saying "mad as a hatter" is often thought to refer to the psychological deterioration of British hat makers whose brains, it was later discovered, were slowly poisoned by the mercury-laden felt material (Smith, 1983). Could schizophrenia symptoms have a similar biochemical key? Scientists are searching for blood proteins that might predict schizophrenia onset (Chan et al., 2015). And as we saw in Module 25, they are tracking the mechanisms by which chemicals produce hallucinations and other symptoms.

Dopamine Overactivity

One possible answer emerged when researchers examined schizophrenia patients' brains after death. They found an excess number of *dopamine* receptors, including a sixfold excess for the dopamine receptor D4 (Seeman et al., 1993; Wong et al., 1986). Such a hyper-responsive dopamine system may intensify brain signals in schizophrenia, creating positive symptoms such as hallucinations and paranoia (Maia & Frank, 2017). Drugs that block dopamine receptors often lessen these symptoms. Drugs that increase dopamine levels, such as amphetamines and cocaine, sometimes intensify them (Basu & Basu, 2015; Farnia et al., 2014).

FYI

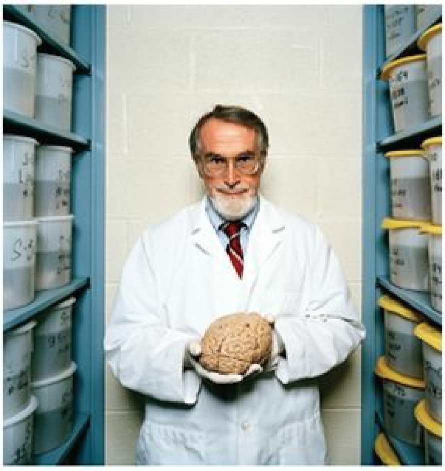
Most people with schizophrenia smoke. Smoking increases vulnerability to schizophrenia and contributes to people with schizophrenia having a 14.5-year shorter-than-average life expectancy (Gurillo et al., 2015; Hjorthøj et al., 2017; Olfson et al., 2015).

Abnormal Brain Activity and Anatomy

Abnormal brain activity and brain structures accompany schizophrenia. Some people diagnosed with schizophrenia have abnormally low brain activity in the frontal lobes, areas that help us reason, plan, and solve problems (Morey et al., 2005; Pettegrew et al., 1993; Resnick, 1992). Brain scans also show a noticeable decline in the brain waves that reflect synchronized neural firing in the frontal lobes (Spencer et al., 2004; Symond et al., 2005).

One study took PET scans of brain activity while people with schizophrenia were hallucinating (Silbersweig et al., 1995). When participants heard a voice or saw something, their brain became vigorously active in several core regions. One was the thalamus, the structure that filters incoming sensory signals and transmits them to the brain’s cortex. Another PET scan study of people with paranoia found increased activity in the amygdala, a fear-processing center (Epstein et al., 1998).

Many studies have also found enlarged, fluid-filled ventricles and a corresponding shrinkage and thinning of cerebral tissue (Goldman et al., 2009; van Haren et al., 2016). People often inherit these brain differences. If one affected identical twin shows brain abnormalities, the odds are at least 1 in 2 that the other twin’s brain will have them (van Haren et al., 2012). Some studies have even found these abnormalities in people who *later* developed the disorder (Karlsgodt et al., 2010). The greater the brain shrinkage, the more severe the thought disorder (Collinson et al., 2003; Nelson et al., 1998; Shenton, 1992).



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Studying the neurophysiology of schizophrenia Psychiatrist E. Fuller Torrey has collected the brains of hundreds of those who died as young adults and suffered disorders such as schizophrenia and bipolar disorder.

Smaller-than-normal areas may include the cortex, the hippocampus, and the corpus callosum connecting the brain's two hemispheres (Arnone et al., 2008; Bois et al., 2016). Another is the thalamus, which may explain why people with schizophrenia have difficulty filtering sensory input and focusing attention (Andreasen et al., 1994; Ellison-Wright et al., 2008). Schizophrenia also tends to involve a loss of neural connections across the brain network (Bohlken et al., 2016; Kambeitz et al., 2016). *The bottom line:* Schizophrenia involves not one isolated brain abnormality but problems with several brain regions and their interconnections (Andreasen, 1997, 2001; Arnedo et al., 2015).

Prenatal Environment and Risk

68-4 What prenatal events are associated with increased risk of developing schizophrenia?

What causes brain abnormalities in people with schizophrenia? Some scientists point to mishaps during prenatal development or delivery (Fatemi & Folsom, 2009; Walker et al., 2010). Risk factors include low birth weight, maternal diabetes, older paternal age, and oxygen deprivation during delivery (King et al., 2010). Famine may also increase risks. People conceived during the peak of World War II's Dutch wartime famine later developed schizophrenia at twice the normal rate. Those conceived during the famine of 1959 to 1961 in eastern China also displayed this doubled rate (St. Clair et al., 2005; Susser et al., 1996).

Let's consider another possible culprit. Might a midpregnancy viral infection impair fetal brain development (Brown & Patterson, 2011)? Can you imagine some ways to test this fetal-virus idea? Scientists have asked the following:

- *Are people at increased risk of schizophrenia if, during the middle of their fetal development, their country experienced a flu epidemic?* The repeated answer has been *Yes* (Mednick et al., 1994; Murray et al., 1992; Wright et al., 1995).
- *Are people born in densely populated areas, where viral diseases spread more readily, at greater risk for schizophrenia?* The answer, confirmed in a study of 1.75 million Danes, has again been *Yes* (Jablensky, 1999; Mortensen, 1999).
- *Are those born during the winter and spring months—those who were in utero during the fall-winter flu season—also at increased risk?* Although the increase is small, just 5 to 8 percent, the answer has been *Yes* (Fox, 2010; Schwartz, 2011; Torrey et al., 1997, 2002).
- *In the Southern Hemisphere, where the seasons are the reverse of the Northern Hemisphere, are the months of above-average pre-schizophrenia births similarly reversed?* Again, the answer has been *Yes*. In Australia, people born between August and October are at greater risk. But people born in the Northern Hemisphere who later moved to Australia still have a greater risk if they were born between January and March (McGrath et al., 1995; McGrath & Welham, 1999).
- *Are mothers who report being sick with influenza during pregnancy more likely to bear children who develop schizophrenia?* In one study of nearly 8000 women, the answer was *Yes*. The schizophrenia risk increased from the customary 1 percent to about 2 percent—but only when infections occurred during the second trimester (Brown et al., 2000). Maternal influenza infection during pregnancy affects brain development in monkeys as well (Short et al., 2010).

- *Does blood drawn from pregnant women whose offspring develop schizophrenia show higher-than-normal levels of antibodies that suggest a viral infection?* In several studies—including one that collected blood samples from some 20,000 pregnant women—the answer has again been *Yes* (Brown et al., 2004; Buka et al., 2001; Canetta et al., 2014).

These converging lines of evidence suggest that fetal-virus infections contribute to the development of schizophrenia. They also strengthen the U.S. government recommendation that "pregnant women need a flu shot" (CDC, 2014b).

Genetic Factors

68-5 How do genes influence schizophrenia? What factors may be early warning signs of schizophrenia in children?

Fetal-virus infections may increase the odds that a child will develop schizophrenia. But many women get the flu during their second trimester of pregnancy, and only 2 percent of them bear children who develop schizophrenia. Why are only some children at risk? Might some people be more genetically vulnerable to schizophrenia? *Yes*. The 1-in-100 odds of any person's being diagnosed with schizophrenia become about 1 in 10 among those who have a sibling or parent with the disorder. If the affected sibling is an identical twin, the odds increase to nearly 1 in 2 (**Figure 68.1**). Those odds remain the same even when the twins are raised apart (Plomin et al., 1997). (Only about a dozen such cases are on record.)

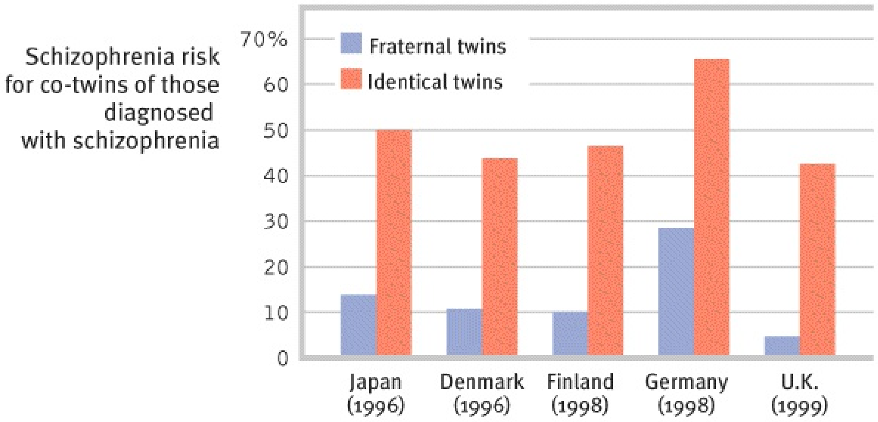


Figure 68.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Gottesman, 2001.

Figure 68.1 Risk of developing schizophrenia

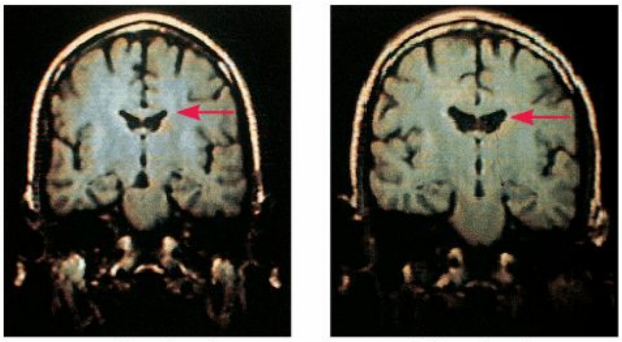
The lifetime risk of developing schizophrenia varies with one's genetic relatedness to someone having this disorder. Across countries, barely more than 1 in 10 fraternal twins, but some 5 in 10 identical twins, share a schizophrenia diagnosis.

Remember, though, that identical twins share more than their genes. They also share a prenatal environment. About two-thirds share a placenta and the blood it supplies; the other third have separate placentas. Shared placentas matter. If the co-twin of an identical twin with schizophrenia shared the placenta, the chances of developing the disorder are 6 in 10. If the identical twins had separate placentas, the co-twin's chances of developing schizophrenia drop to 1 in 10 (Davis et al., 1995; Davis & Phelps, 1995; Phelps et al., 1997). Twins who share a placenta are more likely to share the same prenatal viruses. So perhaps shared germs as well as shared genes produce identical twin similarities.

Adoption studies help untangle genetic and environmental influences. Children adopted by someone who develops schizophrenia do not "catch" the disorder. Rather, adopted children have an elevated risk if a *biological* parent is diagnosed with schizophrenia (Gottesman, 1991). Genes matter.

The search is on for specific genes that, in some combination, predispose schizophrenia-inducing brain abnormalities (**Figure 68.2**). (It is not our genes but our brains that directly control our behavior.) In the biggest-ever study of the genetics of psychiatric disorder, scientists from

35 countries pooled data from the genomes of 37,000 people with schizophrenia and 113,000 people without (Schizophrenia Working Group, 2014). They found 103 genome locations linked with this disorder. Some genes influence the effects of dopamine and other neurotransmitters in the brain. Others affect the production of *myelin*, a fatty substance that coats the axons of nerve cells and lets impulses travel at high speed through neural networks.



No schizophrenia **Schizophrenia**

Figure 68.2
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Daniel Weinberger, M.D., CBDB, NIMH

Figure 68.2 Schizophrenia in identical twins

When twins differ, only the one afflicted with schizophrenia typically has enlarged, fluid-filled cranial cavities (right) (Suddath et al., 1990). The difference between the twins implies some nongenetic factor, such as a virus, is also at work.

Although genes matter, the genetic formula is not as straightforward as the inheritance of eye color. Schizophrenia is a group of disorders influenced by many genes, each with very small effects (Arnedo et al., 2015; Darby et al., 2016; International Schizophrenia Consortium, 2009). And, as we have so often seen, nature and nurture interact. Recall that *epigenetic* factors influence whether genes will be expressed. Like hot water activating a tea bag, environmental factors such as viral infections, nutritional deprivation, and maternal stress can “turn on” the genes that put some of us at higher risk for schizophrenia. Identical twins’ differing histories in the womb and beyond explain why they may show differing gene expressions (Dempster et al., 2013; Walker et al., 2010). Our heredity and our life experiences work together. Neither hand claps alone.

Thanks to our expanding understanding of genetic and brain influences on maladies such as schizophrenia, the general public more and more attributes psychiatric disorders to biological factors (Pescosolido et al., 2010). So, will scientists develop genetic tests that reveal who is at risk? If so, will people in the future subject their embryos to genetic testing (and gene repair or abortion) if they are at risk for this or some other psychological or physical malady? Might they take their egg and sperm to a genetics lab for screening before combining them to produce an embryo? Or will children be tested for genetic risks and given appropriate preventive treatments? In this brave new twenty-first-century world, such questions await answers.

Environmental Triggers for Schizophrenia

If prenatal viruses and genetic predispositions do not, by themselves, cause schizophrenia, neither do family or social factors alone. It remains true, as Susan Nicol and Irving Gottesman (1983) noted over three decades ago, that "no environmental causes have been discovered that will invariably, or even with moderate probability, produce schizophrenia in persons who are not related to" a person with schizophrenia.

Hoping to identify environmental triggers of schizophrenia, researchers have compared the experiences of high-risk children (for example, those with relatives with schizophrenia) and low-risk children. In one 2.5-year study that followed 163 teens and early-twenties adults who had two relatives with schizophrenia, the 20 percent of participants who developed schizophrenia showed social withdrawal or other abnormal behavior before the onset of the disorder (Johnstone et al., 2005). Researchers identified other possible early warning signs, including a mother whose schizophrenia was severe and long-lasting; birth complications (often involving oxygen deprivation and low birth weight); separation from parents; short attention span and poor muscle coordination; disruptive or withdrawn behavior; emotional unpredictability; poor peer relations and solo play; and childhood physical, sexual, or emotional abuse (Abel et al., 2010; Freedman et al., 1998; Schiffman et al., 2001; Susser, 1999; Welham et al., 2009).

* * *

Few of us can relate to the strange thoughts, perceptions, and behaviors of schizophrenia. Sometimes our thoughts jump around, but we rarely talk nonsensically. Occasionally we feel unjustly suspicious of someone, but we do not fear that the world is plotting against us. Often our perceptions err, but rarely do we see or hear things that are not there. We feel regret after laughing at someone’s misfortune, but we rarely giggle in response to our own bad news. At times we just want to be alone, but we do not retreat into fantasy worlds. However, millions of people around the world do talk strangely, suffer delusions, hear nonexistent voices, see things that are not there, laugh or cry at inappropriate times, or withdraw into private imaginary worlds. The quest to solve the cruel puzzle of schizophrenia continues, more vigorously than ever.

✓ Check Your Understanding

Ask Yourself

- Can you recall a time when you heard something or someone casually described as “schizophrenic”? Based on what you’ve read, how was this description accurate or inaccurate?

Test Yourself

- A person with schizophrenia who has _______________ (positive/negative) symptoms may have an expressionless face and toneless voice. These symptoms are most common with _______________ (chronic/acute) schizophrenia and are not likely to respond to drug therapy. Those with _______________ (positive/negative) symptoms are likely to experience delusions, and, if the symptoms have arisen suddenly, to be diagnosed with _______________ (chronic/acute) schizophrenia, which is much more likely to respond to drug therapy.

- What factors contribute to the onset and development of schizophrenia?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 68 REVIEW

68-1 What patterns of perceiving, thinking, and feeling characterize schizophrenia?

- People with schizophrenia display symptoms that are positive (inappropriate behaviors are present) or negative (appropriate behaviors are absent).
- Positive symptoms may include *hallucinations*, *delusions*, talking in a disorganized way, and inappropriate laughter, tears, or rage. Negative symptoms may include toneless voices, expressionless faces, or mute and rigid bodies.

68-2 How do chronic schizophrenia and acute schizophrenia differ?

- In chronic (or process) schizophrenia, the disorder develops gradually and recovery is doubtful.
- In acute (or reactive) schizophrenia, the onset is sudden, in reaction to stress, and the prospects for recovery are brighter.

68-3 What brain abnormalities are associated with schizophrenia?

- People with schizophrenia have increased dopamine receptors, which may intensify brain signals, creating positive symptoms such as hallucinations and paranoia.
- Brain abnormalities associated with schizophrenia include enlarged, fluid-filled areas and corresponding shrinkage and thinning of cerebral tissue.
- Brain scans reveal abnormal activity in the frontal lobes, thalamus, and amygdala, as well as a loss of neural connections across the brain network.

68-4 What prenatal events are associated with increased risk of developing schizophrenia?

- Possible contributing factors include maternal diabetes, older paternal age, viral infections, or famine conditions during the mother’s pregnancy, and low weight or oxygen deprivation at birth.

68-5 How do genes influence schizophrenia? What factors may be early warning signs of schizophrenia in children?

- Twin and adoption studies indicate that the predisposition to schizophrenia is inherited.
- Schizophrenia is influenced by many genes, each with very small effects. Environmental factors—including those present in the prenatal environment—may influence gene expression to enable this disorder.
- While no environmental causes invariably produce schizophrenia, possible early warning signs of later development of schizophrenia include both biological factors (a mother with severe and long-lasting schizophrenia, birth complications, short attention span, and poor muscle coordination) and psychological factors (disruptive or withdrawn behavior, emotional unpredictability, poor peer relations and solo play, separation from parents, and childhood abuse).

Multiple-Choice Questions

1. Believing that aliens are trying to steal her thoughts, Shauna wears a special hat that she designed. Her beliefs represent

a. hallucinations.
b. thickening cerebral tissue.
c. delusions.
d. a word salad.
e. insufficient dopamine receptors.

2. Over several years, Charles gradually developed schizophrenia.

Because of this, the prognosis for recovery is poor. His type of schizophrenia would be referred to as

a. acute.
b. chronic.
c. maternal.
d. catatonic.
e. positive.

3. A person with schizophrenia who is experiencing negative symptoms is likely to demonstrate

a. hallucinations.
b. delusions.
c. disorganized speech.
d. inappropriate laughter.
e. social withdrawal.

Practice FRQs

1. Julia and Eleanor are identical twins who were raised apart. Julia has developed schizophrenia, but Eleanor has not. Given what we know about how schizophrenia is strongly influenced by genetic and prenatal factors, explain how this could happen when Julia and Eleanor have identical genes and shared the same prenatal environment. Provide at least one research-supported factor that could have prompted the onset of schizophrenia in Julia.

Answer

2 points: Environmental factors also contribute to the onset of schizophrenia, which suggests why this disorder is not 100 percent heritable. Researchers have found that severe stress or trauma, such as that caused by separation from parents or childhood physical, sexual, or emotional abuse are associated with later schizophrenia in those who are genetically predisposed to the disorder. Julia's childhood may have been more stressful and traumatic than Eleanor’s, which could explain why Julia but not Eleanor developed schizophrenia.

1. Schizophrenia has been linked to brain and neurotransmitter abnormalities as well as genetics. Explain research findings related to two features of brain anatomy, one neurotransmitter, and one genetic factor that could cause someone to develop schizophrenia.

(4 points)

Module 69 Other Disorders

LEARNING TARGETS

- 69-1 Describe somatic symptom and related disorders.
- 69-2 Describe *dissociative disorders*, and explain why they are controversial.
- 69-3 Identify the three clusters of personality disorders, and explain what behaviors and brain activity characterize the antisocial personality.
- 69-4 Identify the three main eating disorders, and examine how biological, psychological, and social-cultural influences make people more vulnerable to them.

Somatic Symptom and Related Disorders

69-1 What are somatic symptom and related disorders?

Among the most common problems bringing people into doctors’ offices are “medically unexplained illnesses” (Johnson, 2008). Ellen becomes dizzy and nauseated in the late afternoon—shortly before she expects her husband home. Neither her primary care physician nor the neurologist he sent her to could identify a physical cause. They suspect her symptoms have an unconscious psychological origin, possibly triggered by her mixed feelings about her husband. Ellen has a **somatic symptom disorder** (formerly known as *somatoform disorder*), in which distressing symptoms take a somatic (bodily) form without apparent physical causes. One person may have a variety of complaints—vomiting, dizziness, blurred vision, difficulty in swallowing. Another may experience severe and prolonged pain. Culture has a big effect on people’s physical complaints and how they explain them (Kirmayer & Sartorius, 2007). In China, psychological explanations of anxiety and depression are socially less acceptable than in many Western countries, and people less often express the emotional aspects of distress. The Chinese appear more sensitive to—and more willing to report—the physical symptoms of their distress (Ryder et al., 2008). Mr. Wu, a 36-year-old technician in Hunan, illustrates one of China’s most common psychological disorders (Spitzer & Skodol, 2000). He finds work difficult because of his insomnia, fatigue, weakness, and headaches. Chinese herbs and Western medicines provide no relief. To his Chinese clinician, who treats the bodily symptoms, he seems not so much depressed as exhausted. Similar, generalized bodily complaints have often been observed in African cultures (Binitie, 1975).

somatic symptom disorder

a psychological disorder in which the symptoms take a somatic (bodily) form without apparent physical cause. (Formerly called *somatoform disorder;* see *conversion disorder* and *illness anxiety disorder*.)

Even to people in the West, somatic symptoms are familiar. To a lesser extent, we have all experienced inexplicable physical symptoms under stress. It is little comfort to be told that the problem is “all in your head.” Although the symptoms may be psychological in origin, they are nevertheless genuinely felt. A rare related disorder, more common in Freud’s day than in ours, is **conversion disorder** (also known as *functional neurological symptom disorder*), so called because anxiety presumably is converted into a physical symptom. (As we noted in Module 55, Freud’s effort to treat and understand psychological disorders stemmed from his puzzlement over ailments that had no physiological basis.) A patient with a conversion disorder might, for example, lose sensation in a way that makes no neurological sense. Yet the physical symptoms would be real; sticking pins in the affected area would produce no response. Other conversion disorder symptoms might be unexplained paralysis, blindness, or an inability to swallow. In some cases, the person may seem strangely indifferent to the problem.

conversion disorder

a disorder related to somatic symptom disorder in which a person experiences very specific, physical symptoms that are not compatible with recognized medical or neurological conditions. (Also called functional neurological symptom disorder.)

As you can imagine, somatic symptom and related disorders send people not to a psychologist or psychiatrist but to a physician. This is especially true of those who experience **illness anxiety disorder** (previously called *hypochondriasis*). In this relatively common disorder, people interpret normal sensations (a stomach cramp today, a headache tomorrow) as symptoms of a dreaded disease. Sympathy or temporary relief from everyday demands may reinforce such complaints. No amount of reassurance by any physician convinces the patient that the trivial symptoms do not reflect a serious illness. So the patient moves on to another physician, seeking and receiving more medical attention—but failing to confront the disorder's psychological root.

illness anxiety disorder

a disorder related to somatic symptom disorder in which a person interprets normal physical sensations as symptoms of a disease. (Formerly called *hypochondriasis*.)

✓ Check Your Understanding

Ask Yourself

- Can you recall (as most people can) times when you have fretted needlessly over a normal bodily sensation?

Test Yourself

- What does *somatic* mean, and how does it apply to *somatic symptom disorders?*

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Dissociative Disorders

69-2 What are *dissociative disorders*, and why are they controversial?

Among the most bewildering disorders are the rare **dissociative disorders**, in which a person’s conscious awareness *dissociates* (separates) from painful memories, thoughts, and feelings. The result may be a *fugue state*, a sudden loss of memory or change in identity, often in response to an overwhelmingly stressful situation. (Note that this explanation presumes the existence of repressed memories, which, as we noted in Modules 33 and 56, memory researchers have questioned.) Such was the case for one Vietnam veteran who was haunted by his comrades’ deaths, and who had left his World Trade Center office shortly before the 9/11 terrorist attack. Later, he disappeared. Six months later, when he was discovered in a Chicago homeless shelter, he reported no memory of his identity or family (Stone, 2006).

dissociative disorders

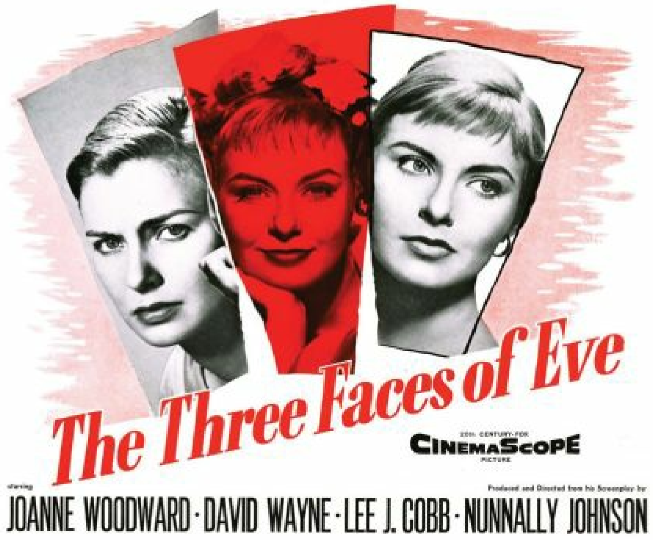
controversial, rare disorders in which conscious awareness becomes separated (dissociated) from previous memories, thoughts, and feelings.

Dissociation itself is not so rare. Any one of us may have a sense of being unreal, of being separated from our body, of watching ourselves as if in a movie. Sometimes we may say, “I was not myself at the time.” Perhaps you can recall getting up to go somewhere and ending up at some unintended location while your mind was preoccupied. Or perhaps you can play a well-practiced tune on a guitar or piano while talking to someone. When we face trauma, dissociative detachment may protect us from being overwhelmed by emotion.

Dissociative Identity Disorder

A massive dissociation of self from ordinary consciousness occurs in **dissociative identity disorder (DID**—formerly called *multiple personality disorder*), in which two or more distinct identities—each with its own voice and mannerisms—seem to control a person's behavior at different times. Thus, the person may be prim and proper one moment, loud and flirtatious the next. Typically, the original personality denies any awareness of the other(s).

dissociative identity disorder (DID)
a rare dissociative disorder in which a person exhibits two or more distinct and alternating personalities. (Formerly called *multiple personality disorder*.)



The Three Faces of Eve
20th Century-Fox
CinemaScope
Picture
starring
Produced and Directed from his Screenplay by
JOANNE WOODWARD · DAVID WAYNE · LEE J. COBB · NUNNALLY JOHNSON

Mary Evans/C20TH Fox/Twentieth Century Fox/Ronald Grant/Everett Collection

Multiple personalities Chris Sizemore's story, told in the book and movie *The Three Faces of Eve*, gave early visibility to what is now called *dissociative identity disorder*.

People diagnosed with DID are rarely violent. But cases have been reported of dissociations into a "good" and a "bad" (or aggressive) personality—a modest version of the Dr. Jekyll–Mr. Hyde split immortalized in Robert Louis Stevenson's story. One unusual case involved Kenneth Bianchi, accused in the "Hillside Strangler" rapes and murders of 10 California women. During a hypnosis session, Bianchi's psychologist “called forth” a hidden personality: “I’ve talked a bit to Ken, but I think that perhaps there might be another part of Ken that . . . maybe feels somewhat differently from the part that I’ve talked to. . . . Would you talk with me, Part, by saying, ‘I’m here’?” Bianchi answered “Yes” and then claimed to be “Steve” (Watkins, 1984).

Speaking as Steve, Bianchi stated that he hated Ken because Ken was nice and that he (Steve), aided by a cousin, had murdered women. He also claimed Ken knew nothing about Steve’s existence and was innocent of the murders. Was Bianchi’s second personality a trick, simply a way of disavowing responsibility for his actions? Indeed, Bianchi—a practiced liar who had read about multiple personality in psychology books—was later convicted.

Understanding Dissociative Identity Disorder

Skeptics question DID. First, instead of being a true disorder, could DID be an extension of our normal capacity for personality shifts? Nicholas Spanos (1986, 1994, 1996) asked college students to pretend they were accused murderers being examined by a psychiatrist. Given the same hypnotic treatment Bianchi received, most spontaneously expressed a second personality. This discovery made Spanos wonder: Perhaps dissociative identities are simply a more extreme version of the varied “selves” we normally present—as when we display a goofy, loud self while hanging out with friends, and a subdued, respectful self around grandparents. Are clinicians who discover multiple personalities merely triggering role playing by fantasy-prone people? Do these people, like actors who commonly report “losing themselves” in their roles, then convince themselves of the authenticity of their own role enactments? Spanos was no stranger to this line of thinking. In a related research area, he had also raised these questions about the hypnotic state. Because most DID patients are highly hypnotizable, whatever explains one condition—dissociation or role playing—may help explain the other.

> “*Pretense may become reality.*”

Chinese proverb

Skeptics also find it suspicious that the disorder has such a short and localized history. Between 1930 and 1960, the number of North American DID diagnoses averaged 2 per decade. By the 1980s, when the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* (DSM) contained the first formal code for this disorder, the number had exploded to more than 20,000 (McHugh, 1995a). The average number of displayed personalities also mushroomed—from 3 to 12 per patient (Goff & Simms, 1993). Although diagnoses are increasing in countries where DID has been publicized, the disorder is much less prevalent outside North America (Lilienfeld, 2017). In Britain, diagnosis of DID—which some have considered "a wacky American fad" (Cohen, 1995)—has been rare.

The Mankato Free Press/AP Photo

Widespread dissociation Shirley Mason was a psychiatric patient diagnosed with dissociative identity disorder. Her life formed the basis of the bestselling book *Sybil* (Schreiber, 1973) and of two movies. Some argue that the book and movies' popularity fueled the dramatic rise in diagnoses of DID. Skeptics wonder whether Mason actually had the disorder (Nathan, 2011).

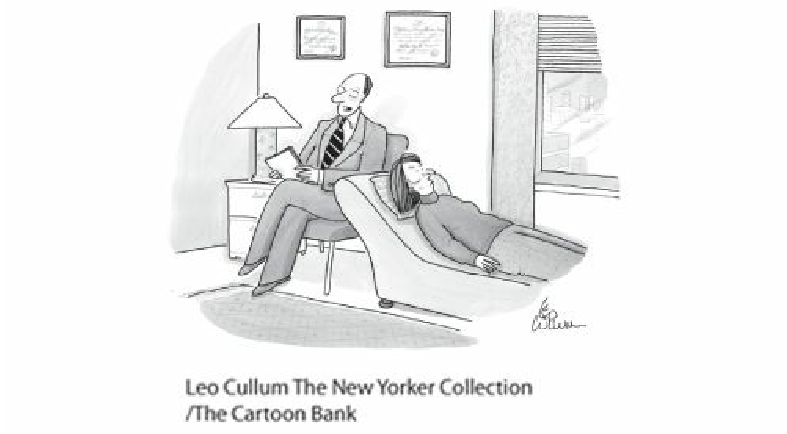
Such findings, skeptics have noted, point to a disorder of suggestible, fantasy-prone people created by therapists in a particular social context (Giesbrecht et al., 2008, 2010; Lynn et al., 2014; Merskey, 1992). Clients do not enter therapy saying "Allow me to introduce myselves." Instead, charge the critics, some therapists go fishing for multiple personalities: “*Have you ever felt like another part of you does things you can’t control? Does this part of you have a name? Can I talk to the angry part of you?*” Once clients permit a therapist to talk, by name, “to the part of you that says those angry things,” they begin acting out the fantasy. The result may be the experience of another self.

Other researchers and clinicians believe DID is a real disorder. They cite findings of distinct body and brain states associated with differing personalities (Putnam, 1991). Abnormal brain anatomy and activity can also accompany DID. Brain scans show shrinkage in areas that aid memory and detection of threat (Vermetten et al., 2006). Heightened activity appears in brain areas associated with the control and inhibition of traumatic memories (Elzinga et al., 2007).

Both the psychodynamic and learning perspectives have interpreted DID symptoms as ways of coping with anxiety. Some psychodynamic theorists see them as defenses against the anxiety caused by the eruption of unacceptable impulses. In this view, a second personality enables the discharge of forbidden impulses. Learning theorists see dissociative disorders as behaviors reinforced by anxiety reduction.

> “*Though this be madness, yet there is method in’t.*”
>
> *William Shakespeare,* Hamlet, *1600*

Some clinicians include dissociative disorders under the umbrella of posttraumatic stress disorder—a natural, protective response to traumatic experiences during childhood (Brand et al., 2016; Spiegel, 2008). Many people being treated for DID recall being physically, sexually, or emotionally abused as children (Gleaves, 1996; Lilienfeld et al., 1999). In one study of 12 murderers diagnosed with DID, 11 had suffered severe, torturous child abuse (Lewis et al., 1997). One had been set afire by his parents. Another had been used in child pornography and was scarred from being made to sit on a stove burner. Some critics wonder, however, whether vivid imagination or therapist suggestion contributed to such recollections (Kihlstrom, 2005).


Leo Cullum The New Yorker Collection
/The Cartoon Bank

"Would it be possible to speak with the personality that pays the bills?"

So the debate continues. On one side are those who believe multiple personalities are the desperate efforts of people trying to detach from a horrific existence. On the other are skeptics who think DID is constructed out of the therapist-client interaction and acted out by fantasy-prone, emotionally vulnerable people. If the skeptics' view wins, predicted psychiatrist Paul McHugh (1995b), "this epidemic will end in the way that the witch craze ended in Salem. The [multiple personality phenomenon] will be seen as manufactured."

✓ Check Your Understanding

Ask Yourself

- Do you ever flip between displays of different aspects of your personality? How is your experience similar to and different from the symptoms of dissociative identity disorder?

Test Yourself

- The psychodynamic and learning perspectives agree that dissociative identity disorder symptoms are ways of dealing with anxiety. How do their explanations differ?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Personality Disorders

69-3 What are the three clusters of personality disorders? What behaviors and brain activity characterize the antisocial personality?

The inflexible and enduring behavior patterns of **personality disorders** interfere with social functioning. The ten disorders in DSM-5 tend to form three clusters, characterized by

- anxiety, such as a fearful sensitivity to rejection that predisposes the withdrawn *avoidant personality disorder*.
- eccentric or odd behaviors, such as the emotionless disengagement of *schizotypal personality disorder*.
- dramatic or impulsive behaviors, such as the attention-getting *borderline personality disorder*, the self-focused and self-inflating *narcissistic personality disorder*, and—what we next discuss as an in-depth example—the callous, and often dangerous, *antisocial personality disorder*.

personality disorders

inflexible and enduring behavior patterns that impair social functioning.

Antisocial Personality Disorder

People with **antisocial personality disorder**, usually male, can display symptoms by age 8. Their lack of conscience becomes plain before age 15, as they begin to lie, steal, fight, or display unrestrained sexual behavior (Cale & Lilienfeld, 2002). Not all children with these traits become antisocial adults. (Note: “Antisocial” means disruptive, not just unsociable.) Those who do (about half of them) will generally act in violent or otherwise criminal ways, be unable to keep a job, and, if they have a spouse or children, behave irresponsibly toward them (Farrington, 1991). People with antisocial personality disorder (sometimes called *sociopaths* or *psychopaths*) may show lower *emotional intelligence*—the ability to understand, manage, and perceive emotions (Ermer et al., 2012).

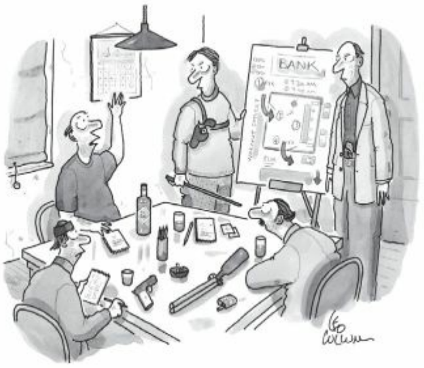
antisocial personality disorder

a personality disorder in which a person (usually a man) exhibits a lack of conscience for wrongdoing, even toward friends and family members; may be aggressive and ruthless or a clever con artist.

Despite their remorseless and sometimes criminal behavior, criminality is not an essential component of antisocial behavior (Skeem & Cooke, 2010). Moreover, many criminals do not fit the description of antisocial personality disorder. Why? Because they're not impulsive (Geurts et al., 2016). Rather, they actually show responsible concern for their friends and family members. When the antisocial personality combines a keen intelligence with amorality, the result may be a charming and clever con artist—or a fearless, focused, ruthless soldier, surgeon, or CEO (Dutton, 2012; Schutte et al., 2016).

JEFF TUTTLE/Tribune News Service/Newscom

No remorse Dennis Rader, known as the "BTK killer" in Kansas, was convicted in 2005 of killing 10 people over a 30-year span. Rader exhibited the extreme lack of conscience that marks antisocial personality disorder.



Leo Cullum The New Yorker Collection/The Cartoon Bank

“Thursday is out. I have jury duty.”

Many criminals, like this one, exhibit a sense of conscience and responsibility in other areas of their life, and thus do not exhibit antisocial personality disorder.

Antisocial personalities behave impulsively, and then feel and fear little (Fowles & Dindo, 2009). Their impulsivity can have horrific consequences (Camp et al., 2013). Consider the case of Henry Lee Lucas. He killed his first victim when he was 13. He felt little regret then or later. During his years of crime, he brutally murdered 157 women, men, and children. For the last six years of his reign of terror, Lucas teamed with Ottis Elwood Toole, who reportedly slaughtered people he “didn’t think was worth living anyhow” (Darrach & Norris, 1984).

Understanding Antisocial Personality Disorder

Antisocial personality disorder is woven of both biological and psychological strands. Twin and adoption studies reveal that biological relatives of people with antisocial and unemotional tendencies are at increased risk for antisocial behavior (Frisell et al., 2012; Kendler et al., 2015b). People with antisocial personalities sometimes spread their genes to future generations by marrying others who have antisocial personalities (Weiss et al., 2017). No single gene codes for a complex behavior such as crime. Molecular geneticists have, however, identified some specific genes that are more common in those with antisocial personality disorder (Gunter et al., 2010).

The genetic vulnerability of people with antisocial and unemotional tendencies appears as low arousal in response to threats. Awaiting aversive events, such as electric shocks or loud noises, they show little autonomic nervous system arousal (Hare, 1975; Hoppenbrouwers et al., 2016). Long-term studies show that their stress hormone levels were lower than average as teenagers, before committing any crime (**Figure 69.1**). And those who were slow to develop conditioned fears at age 3 were also more likely to commit a crime later in life (Gao et al., 2010). Other studies have found that preschool boys who later became aggressive or antisocial adolescents tended to be impulsive, uninhibited, unconcerned with social rewards, and low in anxiety (Caspi et al., 1996; Tremblay et al., 1994).

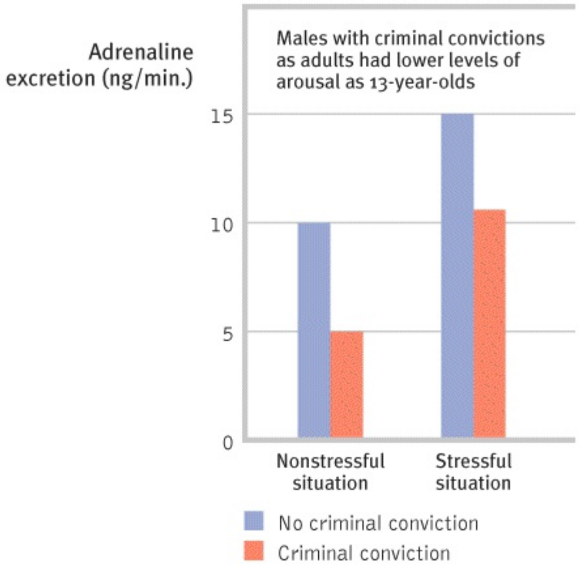


Figure 69.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Magnusson, 1990.

Figure 69.1 Cold-blooded arousability and risk of crime

Levels of the stress hormone adrenaline were measured in two groups of 13-year-old Swedish boys. In both stressful and nonstressful situations, those who would later be convicted of a crime as 18- to 26-year-olds showed relatively low arousal.

Traits such as fearlessness and dominance can be adaptive. If channeled in more productive directions, fearlessness may lead to athletic stardom, adventurism, or courageous heroism (Smith et al., 2013). In one analysis, 42 American presidents scored higher than the general population on such traits as fearlessness and dominance (Lilienfeld et al., 2012, 2016). Patient S. M., a 49-year-old woman who experienced damage to her amygdala, showed fearlessness and impulsivity but also displayed acts of heroism (Lilienfeld et al., 2017). For example, she gave a man in need her only coat and scarf. Befriending a child with cancer, how did she respond? She cut her hair short and donated it to the Locks of Love charity.

Genetic influences, often in combination with negative environmental factors such as childhood abuse, family instability, or poverty, help wire the brain (Dodge, 2009). In people with antisocial criminal tendencies, the emotion-controlling amygdala is smaller (Pardini et al., 2014). The frontal lobes are also less active, as Adrian Raine (1999, 2005) found when he compared PET scans of 41 murderers' brains with those from people of similar age and sex (**Figure 69.2**). The frontal lobes help control impulses. The reduced activation was especially apparent in those who murdered impulsively. In a follow-up study, Raine and his team (2000) found that violent repeat offenders had 11 percent less frontal lobe tissue than normal. This helps explain why people with antisocial personality disorder exhibit marked deficits in frontal lobe cognitive functions, such as planning, organization, and inhibition (Morgan & Lilienfeld, 2000). Compared with people who feel and display empathy, their brains also respond less to facial displays of others' distress, which may contribute to their lower emotional intelligence (Deeley et al., 2006).

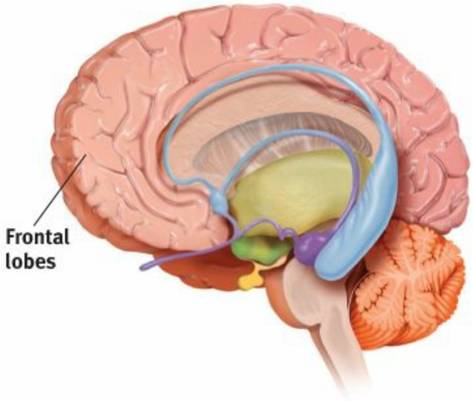


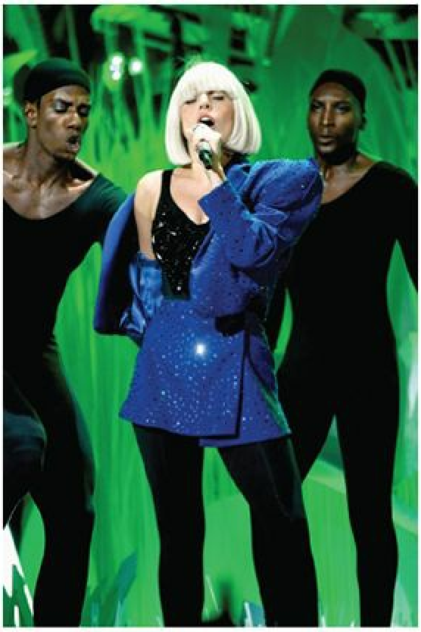
Figure 69.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 69.2 Murderous minds

Researchers have found reduced activation in a murderer’s frontal lobes. This brain area (shown in a left-facing brain) helps brake impulsive, aggressive behavior (Raine, 1999).

A biologically based fearlessness, as well as early environment, helps explain an unusual family reunion. Long-separated sisters Joyce Lott, 27, and Mary Jones, 29, came together at a place that normally separates family members rather than brings them together—a South Carolina prison where both were sent on drug charges. After a newspaper story about their reunion, their long-lost half-brother Frank Strickland called. But he had his own problem: He was stuck in jail on drug, burglary, and larceny charges (Shepherd et al., 1990). The genes that put people at risk for antisocial behavior also put people at risk for substance use disorders, which may help explain why these disorders often appear in combination (Dick, 2007).

Genetics alone do not tell the whole story of antisocial crime, however. In another Raine-led study (1996), researchers checked criminal records on nearly 400 Danish men at ages 20 to 22. All these men either had experienced biological risk factors at birth (such as premature birth) or came from family backgrounds marked by poverty and family instability. The researchers then compared each of these two groups with a third *biosocial* group (people whose lives were marked by *both* those biological and social risk factors). The biosocial group had double the risk of committing crime. Similar findings emerged from a famous study that followed 1037 children for a quarter-century: Two combined factors—childhood maltreatment and a gene that altered neurotransmitter balance—predicted antisocial problems (Caspi et al., 2002). Neither “bad” genes alone nor a “bad” environment alone predisposed later antisocial behavior. Rather, genes predisposed some children to be more sensitive to maltreatment. Within “genetically vulnerable segments of the population,” environmental influences matter—for better or for worse (Belsky & Pluess, 2009; Moffitt, 2005).



Jeff Kravitz/Getty Images

Battling with body image Many celebrities, including Lady Gaga, have struggled publicly with eating disorders.

With antisocial behavior, as with so much else, nature and nurture interact and the biopsychosocial perspective helps us understand the whole story. To explore the neural basis of antisocial personality disorder, neuroscientists are trying to identify brain activity differences in criminals who display symptoms of this disorder. Shown emotionally evocative photographs, such as a man holding a knife to a woman's throat, criminals with antisocial personality disorder display blunted heart rate and perspiration responses, and less activity in brain areas that typically respond to emotional stimuli (Harenski et al., 2010; Kiehl & Buckholtz, 2010). They also have a larger and hyper-reactive dopamine reward system, which predisposes their impulsive drive to do something rewarding despite the consequences (Buckholtz et al., 2010; Glenn et al., 2010). Such data provide another reminder: Everything psychological is also biological.

Eating Disorders

69-4 What are the three main eating disorders, and how do biological, psychological, and social-cultural influences make people more vulnerable to them?

Our bodies are naturally disposed to maintain a steady weight, including storing energy for times when food becomes unavailable. But sometimes psychological influences overwhelm biological wisdom. This becomes painfully clear in three eating disorders.

- **Anorexia nervosa** typically begins as a weight-loss diet. People with anorexia—usually female adolescents, but some women, men, and boys as well—drop significantly below normal weight. Yet they feel fat, fear being fat, diet obsessively, and sometimes exercise excessively. About half of those with anorexia display a binge-purge-depression cycle.
- **Bulimia nervosa**, unlike anorexia, is marked by weight fluctuations within or above normal ranges, making the condition easier to hide. Bulimia may also be triggered by a weight-loss diet, broken by gorging on forbidden foods. People with this disorder—mostly women in their late teens or early twenties (but also some men)—eat in spurts, sometimes influenced by negative emotion or by friends who are bingeing (Crandall, 1988; Haedt-Matt & Keel, 2011). In a cycle of repeating episodes, overeating is followed by compensatory vomiting, laxative use, fasting, or excessive exercise (Wonderlich et al., 2007). Preoccupied with food (craving sweet and high-fat foods), and fearful of becoming overweight, binge-purge eaters experience bouts of depression, guilt, and anxiety during and following binges (Hinz & Williamson, 1987; Johnson et al., 2002).
- Those with **binge-eating disorder** engage in significant bouts of overeating, followed by remorse. But they do not purge, fast, or exercise excessively and thus may be overweight.

anorexia nervosa

an eating disorder in which a person (usually an adolescent female) maintains a starvation diet despite being significantly underweight; sometimes accompanied by excessive exercise.

bulimia nervosa

an eating disorder in which a person’s binge eating (usually of high-calorie foods) is followed by inappropriate weight-loss promoting behavior, such as vomiting, laxative use, fasting, or excessive exercise.

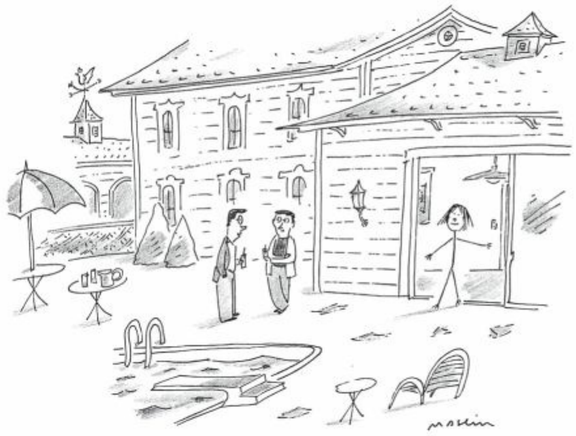
binge-eating disorder

significant binge-eating episodes, followed by distress, disgust, or guilt, but without the compensatory behavior that marks bulimia nervosa.

A U.S. National Institute of Mental Health-funded study reported that, at some point during their lifetime, 0.6 percent of Americans met the criteria for anorexia, 1 percent for bulimia, and 2.8 percent for binge-eating disorder (Hudson et al., 2007). Anorexia and bulimia can be deadly. They harm the body and mind, resulting in shorter life expectancy and greater risk of suicide and nonsuicidal self-injury (Cucchi et al., 2016; Fichter & Quadflieg, 2016; Smith et al., 2016).

© Nick Holt Photography

Sibling rivalry gone awry Twins Maria and Katy Campbell have anorexia nervosa. As children they competed to see who could be thinner. Now, says Maria, her anorexia nervosa is “like a ball and chain around my ankle that I can’t throw off” (Foster, 2011).



The New Yorker Collection, 1999, Michael Maslin from cartoonbank.com. All Rights Reserved

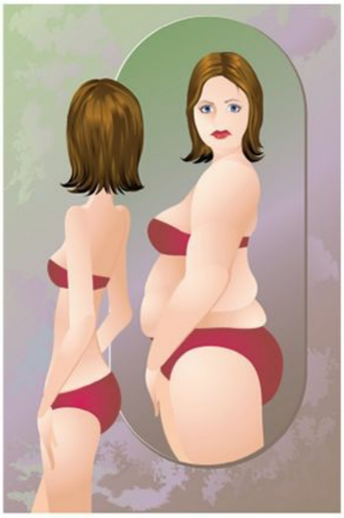
“Gee, I had no idea you were married to a supermodel.”

Understanding Eating Disorders

Eating disorders are *not* (as some have speculated) a telltale sign of childhood sexual abuse (Smolak & Murnen, 2002; Stice, 2002). The family environment may influence eating disorders in other ways, however. For example, the families of those with anorexia tend to be competitive, high-achieving, and protective (Ahrén et al., 2013; Berg et al., 2014; Yates, 1989, 1990).

Those with eating disorders often have low self-evaluations, set perfectionist standards, fret about falling short of expectations, and are intensely concerned with how others perceive them (Culbert et al., 2015; Farstad et al., 2016; Yiend et al., 2014). Some of these factors also predict teen boys’ pursuit of unrealistic muscularity (Ricciardelli & McCabe, 2004).

Heredity also matters. Identical twins share these disorders more often than fraternal twins do (Culbert et al., 2009; Klump et al., 2009; Root et al., 2010). Scientists are searching for culprit genes, which may influence the body’s available serotonin and estrogen (Klump & Culbert, 2007). Data from 15 studies indicate that having a gene that reduces available serotonin adds 30 percent to a person’s risk of anorexia or bulimia (Calati et al., 2011).



artbyjulie/Getty Images

A distorted body image underlies anorexia.

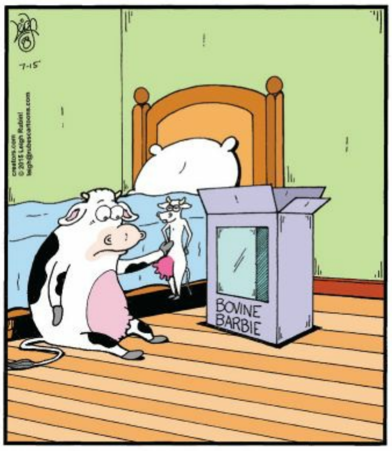
But eating disorders also have cultural and gender components. Ideal shapes vary across culture and time. In countries with high rates of poverty—where plump means prosperous and thin can signal poverty or illness—bigger often seems better (Knickmeyer, 2001; Swami et al., 2010). Bigger less often seems better in Western cultures, where, according to 222 studies of 141,000 people, the rise in eating disorders in the last half of the twentieth century coincided with a dramatic increase in women having a poor body image (Feingold & Mazzella, 1998).

Those most vulnerable to eating disorders are also those (usually women or gay men) who most idealize thinness and have the greatest body dissatisfaction (Feldman & Meyer, 2010; Kane, 2010; Stice et al., 2010). Should it surprise us, then, that women who view real and doctored images of unnaturally thin models and celebrities often feel ashamed, depressed, and dissatisfied with their own bodies—the very attitudes that predispose eating disorders (Grabe et al., 2008; Myers & Crowther, 2009; Tiggemann & Miller, 2010)? Researchers tested this modeling idea by giving some adolescent girls (but not others) a 15-month subscription to an American teen-fashion magazine (Stice et al., 2001). Compared with those who had not received the magazine, vulnerable girls—defined as those who were already dissatisfied, idealizing thinness, and lacking social support—exhibited increased body dissatisfaction and eating disorder tendencies.

Even ultra-thin models do not reflect the impossible standard of the old classic Barbie doll, who had, when adjusted to a height of 5 feet 7 inches, a 32–16–29 figure (in centimeters, 81–41–74) (Norton et al., 1996).

> “*Why do women have such low self-esteem? There are many complex psychological and societal reasons, by which I mean Barbie.*”
>
> *Dave Barry, 1999*

There is, however, more to body dissatisfaction and anorexia than media effects (Ferguson et al., 2011). Peer influences, such as teasing, also matter. Nevertheless, the sickness of today’s eating disorders stems in part from today’s weight-obsessed culture—a culture that says “fat is bad” in countless ways, that motivates millions of women to diet constantly, and that invites eating binges by pressuring women to live in a constant state of semistarvation. One former model recalled walking into a meeting with her agent, starving and with her organs failing due to anorexia (Caroll, 2013). Her agent’s greeting: “Whatever you are doing, keep doing it.”



Leigh Rubes/Creators Syndicate, Inc.

“Up until that point, Bernice had never once had a problem with low self-esteem.”

Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Too thin? Anorexia was identified and named in the 1870s, when it appeared among affluent adolescent girls (Brumberg, 2000). Many worry that today's superthin models make self-starvation seem fashionable. In response to this concern, British advertising regulators banned this advertisement because the female model appeared "unhealthily thin."

Most people diagnosed with an eating disorder do improve. In one 22-year study, 2 in 3 women with anorexia nervosa or bulimia nervosa had recovered (Eddy et al., 2017). It's also possible to prevent people from developing these disorders. Interactive programs that teach people (especially girls over age 15) to accept their bodies reduce the likelihood of an eating disorder (Beintner et al., 2012; Melioli et al., 2016; Vocks et al., 2010). By combating cultural learning, those at risk for eating disorders may instead live long and healthy lives.

* * *

The bewilderment, fear, and sorrow caused by psychological disorders are real. But, as our next topic—therapy—shows, hope, too, is real.

✓ Check Your Understanding

Ask Yourself

- Given what we have learned in earlier units about the powers and limits of parental influence, how much do you think parents affect the risk of a child's developing antisocial personality disorder?

Test Yourself

- How do biological and psychological factors contribute to antisocial personality disorder?
- People with _______________ (anorexia nervosa/bulimia nervosa) continue to want to lose weight even when they are underweight. Those with _______________ (anorexia nervosa/bulimia nervosa) tend to have weight that fluctuates within or above normal ranges.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 69 REVIEW

69-1 What are somatic symptom and related disorders?

- *Somatic symptom disorder* presents a somatic (bodily) symptom—a physiologically unexplained but genuinely felt ailment.
- In the related *conversion disorder* (also called functional neurological symptom disorder), anxiety appears converted to a physical symptom that has no reasonable neurological or medical basis.
- The more common *illness anxiety disorder*, another related disorder, involves the interpretation of normal sensations as a dreaded disorder.

69-2 What are *dissociative disorders*, and why are they controversial?

- *Dissociative disorders* are conditions in which conscious awareness seems to become separated from previous memories, thoughts, and feelings.
- Skeptics note that *dissociative identity disorder*, formerly known as multiple personality disorder, increased dramatically in the late twentieth century, that it is rarely found outside North America, and that it may reflect role-playing by people who are vulnerable to therapists' suggestions. Others view this disorder as a manifestation of feelings of anxiety, or as a response learned when behaviors are reinforced by anxiety reduction.

69-3 What are the three clusters of personality disorders? What behaviors and brain activity characterize the antisocial personality?

- *Personality disorders* are disruptive, inflexible, and enduring behavior patterns that impair social functioning.

- These disorders form clusters, based on three main characteristics: (1) anxiety; (2) eccentric or odd behaviors; and (3) dramatic or impulsive behaviors.
- *Antisocial personality disorder* is characterized by a lack of conscience and, sometimes, by aggressive and fearless behavior. The amygdala is smaller and the frontal lobes less active in people with this disorder, leading to impaired frontal lobe cognitive functions and decreased responsiveness to others' distress. Genetic predispositions may interact with the environment to produce these characteristics.

69-4 What are the three main eating disorders, and how do biological, psychological, and social-cultural influences make people more vulnerable to them?

- Anorexia nervosa, bulimia nervosa, and binge-eating disorder are the three main eating disorders.
- Despite being significantly underweight, people with *anorexia nervosa* (usually adolescent females) continue to diet because they view themselves as fat.
- Those with *bulimia nervosa* (usually females in their late teens and twenties) secretly binge and then compensate by purging, fasting, or excessively exercising. Unlike anorexia, bulimia is marked by weight fluctuations within or above normal ranges.
- Those with *binge-eating disorder* binge but do not follow bingeing with purging, fasting, or exercise.
- Low self-esteem, perfectionism, concern with others' perceptions, and cultural pressure—which include body ideals that vary across time and place, often perpetuated through media—interact with stressful life experiences and genetics to produce eating disorders.

Multiple-Choice Questions

1. Adela regularly interprets everyday aches and pains, such as stomach cramps and headaches, as serious medical problems. Her doctor is unable to convince her that her problems are not serious. Adela suffers from

a. dissociative identity disorder.
b. antisocial personality disorder.
c. a fugue state.
d. illness anxiety disorder.
e. anorexia nervosa.

2. Karl, a 45-year-old barber, had worked in the same shop his entire life. Last year he disappeared and was found working as a car mechanic known as “K” 300 miles away, saying he had no memory of his former life. Karl’s clinical diagnosis would most likely be

a. schizophrenia.
b. antisocial personality disorder.
c. a fugue state.
d. a conversion disorder.
e. dissociative identity disorder.

3. Antisocial personality disorder is most often characterized by

a. violence.
b. lack of conscience.
c. mood swings.
d. unexplained physical symptoms.
e. committing serial murders.

Practice FRQs

1. Contrast and compare the following eating disorders:

- Anorexia nervosa
- Bulimia nervosa
- Binge-eating disorder

Answer

1 point: Individuals with anorexia nervosa have a distorted body image: They feel “fat” and continue to follow a starvation diet to lose weight even after they’ve become significantly underweight. Onset is usually during adolescence and in females, though men may also develop this disorder. Page 712

1 point: Individuals with bulimia nervosa are also distressed about their weight. These individuals alternate between bingeing and purging. Most people with the disorder are women in their late teens or twenties, but men may also suffer from bulimia. Page 713

1 point: Individuals with binge-eating disorder binge without purging. Page 713

2. Dissociative identity disorder (DID) is among the most controversial of all psychological disorders. Briefly describe the disorder. Then, provide one piece of evidence that supports the existence of the disorder and one piece of evidence that would indicate the disorder might not be genuine.

(3 points)

UNIT XII REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

psychological disorder, p. 666
medical model, p. 667
epigenetics, p. 668
DSM-5, p. 669
attention-deficit/hyperactivity disorder (ADHD), p. 670
anxiety disorders, p. 677
social anxiety disorder, p. 677
generalized anxiety disorder, p. 677
panic disorder, p. 678
agoraphobia, p. 678
phobia, p. 679
obsessive-compulsive disorder (OCD), p. 679
posttraumatic stress disorder (PTSD), p. 680
major depressive disorder, p. 687
bipolar disorder, p. 687
mania, p. 687
rumination, p. 693
schizophrenia, p. 699
psychotic disorders, p. 699
hallucination, p. 699
delusion, p. 699
chronic schizophrenia, p. 700
acute schizophrenia, p. 701
somatic symptom disorder, p. 707
conversion disorder, p. 707
illness anxiety disorder, p. 707

dissociative disorders, p. 708

dissociative identity disorder (DID), p. 708

personality disorders, p. 710

antisocial personality disorder, p. 710

anorexia nervosa, p. 712

bulimia nervosa, p. 713

binge-eating disorder, p. 713

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. When psychological symptoms interfere with daily life they are considered

a. catatonic.
b. flat.
c. dysfunctional.
d. positive.
e. negative.

2. The risk of bipolar disorder dramatically increases if you

a. have suffered a debilitating injury.
b. have an adoptive parent who has the disorder.
c. have a biological parent with the disorder.
d. have a life-threatening illness.
e. have above-average intelligence.

3. Jessica and Harper are identical twins. Jessica has been diagnosed with a psychological disorder. Harper is most at risk for developing the same disorder if Jessica is diagnosed with

a. agoraphobia.
b. antisocial personality disorder.
c. bipolar disorder.
d. bulimia nervosa.

e. schizophrenia.

4. In the United States, suicide rates are highest

a. during the middle of the winter.
b. among those with depression who are beginning to recover.
c. among women ages 45–55.
d. among married people.
e. among Hispanic men.

5. People with obsessive-compulsive disorder may report feeling less anxious after they clean, which causes them to want to clean again the next time they feel anxious. This demonstrates the principle of

a. stimulus generalization.
b. stimulus discrimination.
c. punishment.
d. spontaneous recovery.
e. reinforcement.

6. A split from reality that shows itself in disorganized speech, disturbed perceptions, and/or diminished or inappropriate emotional expression is associated with which psychological disorder?

a. Schizophrenia
b. Phobias
c. Depressive disorders
d. Bipolar disorder
e. Anxiety disorders

7. The nearly 1-in-100 odds of any person being diagnosed with schizophrenia become about 1 in 10 among those

a. who also suffer from an anxiety disorder.
b. whose parent has the disorder.
c. who have been diagnosed with a depressive disorder.
d. who live with someone diagnosed with schizophrenia.
e. whose fraternal twin has schizophrenia.

8. Which of the following can be characterized as a compulsion?

a. Worry about exposure to germs or toxins
b. Fear that something terrible is about to happen
c. Concern with making sure things are in symmetrical order
d. Anxiety when objects are not lined up in an exact pattern
e. Checking repeatedly to see if doors are locked

9. Amanda has been diagnosed with schizophrenia. Her main symptom is hearing voices that are not there, which is known as a

a. word salad.
b. delusion.
c. paranoid thought.
d. rumination.
e. hallucination.

0. Convinced that she is fat, Lu diets excessively and spends at least one hour a day in the gym before school. Lu has gotten very thin, and her parents are concerned that she may be developing

a. illness anxiety disorder.
b. binge-eating disorder.
c. bulimia nervosa.
d. anorexia nervosa.
e. DID.

1. What is the most common reason people seek mental health services?

a. Depression
b. Bipolar disorder
c. Posttraumatic stress disorder
d. Dissociative identity disorder
e. Illness anxiety disorder

2. Brain scans of people with schizophrenia show

a. abnormally high brain activity in the frontal lobes.
b. an increase in the brain waves that reflect synchronized neural

firing.

c. abnormal activity in multiple brain areas.
d. decreased activity in the amygdala.
e. a lack of dopamine receptors.

3. Bert feels no regret after violating others’ rights and is quite clever at manipulating those around him. Bert would most likely be diagnosed with

a. antisocial personality disorder.
b. avoidant personality disorder.
c. schizotypal personality disorder.
d. histrionic personality disorder.
e. narcissistic personality disorder.

4. What term refers to thoughts about who or what we blame for our successes and failures?

a. Stability
b. Emotional memory
c. The social-cognitive perspective
d. Explanatory style
e. Dissociative reasoning

5. Psychologists have found _____ in every known culture.

a. bulimia nervosa
b. anorexia nervosa
c. susto
d. schizophrenia
e. taijin-kyofusho

6. Kayla’s uncle fought in an overseas war zone. After returning home, he finds it difficult to sleep and has a feeling of near constant anxiety. A psychiatrist would most likely offer him treatment for

a. posttraumatic stress disorder.
b. illness anxiety disorder.

c. panic disorder.
d. conversion disorder.
e. bipolar disorder.

7. Modern psychologists contend that all behavior, whether it is called normal or disordered, arises from the interaction of

a. genetics and physiology.
b. children and parents.
c. experience and wisdom.
d. inborn tendencies and drives.
e. nature and nurture.

8. Which of the following are symptoms of generalized anxiety disorder?

a. Unexplainable and continual tension
b. Sudden episodes of intense dread
c. Irrational and intense fear of a specific object or situation
d. Repetitive thoughts or actions
e. Nightmares for weeks after a traumatic event

9. Worried that she may hit her father, Maeve finds that her hand has suddenly gone numb. Her most likely diagnosis would be

a. a phobia.
b. generalized anxiety disorder.
c. a conversion disorder.
d. chronic schizophrenia.
e. illness anxiety disorder.

0. An MRI shows that a patient has enlarged ventricles in the brain. A likely diagnosis would be

I. schizophrenia.
II. bipolar disorder.
III. DID.

a. I only
b. II only

c. III only
d. I & II only
e. I & III only

Free-Response Questions

1. After reading her AP® Psychology text, Jane starts to wonder if all young people have some kind of psychological disorder. First, briefly explain what you might say to Jane about the criteria psychologists use when diagnosing mental illnesses. Then, briefly explain the symptoms associated with the following diagnoses and how age might be related to each diagnosis:

- ADHD
- Anorexia nervosa
- OCD
- Bipolar disorder

Rubric for Free-Response Question 1

1 point: Psychologists define a disorder as a significant disturbance in an individual's cognition, emotion regulation, or behavior that is dysfunctional or maladaptive. Jane's general statement that all young people have a psychological disorder doesn't make sense in this context: It's not likely that all young people have significant disturbances that interfere with their day-to-day lives. Page 666

1 point: The symptoms of ADHD include inattention, hyperactivity, and impulsivity. ADHD is diagnosed more often in young people, but some adults are also diagnosed with ADHD. Page 671

1 point: Individuals with anorexia nervosa have a distorted body image: They feel "fat" and continue to follow a starvation diet to lose weight even after they've become significantly underweight. These symptoms usually appear in adolescent females, but males and older women may also suffer from this disorder. Page 712

1 point: Individuals with OCD experience unwanted repetitive thoughts (obsessions) and actions (compulsions). This disorder is most commonly diagnosed in teens and young adults. Page 679

1 point: People with bipolar disorder will alternate between feelings of mania and feelings of depression. This disorder affects males and females equally and may be diagnosed at any age. Page 687

2. Describe what the terms *obsession* and *compulsion* refer to in the context of obsessive-compulsive disorder (OCD). Then, do the following:

- Provide an example of a common obsession experienced by individuals with OCD.
- Provide an example of a common compulsion experienced by individuals with OCD.
- Briefly explain how the learning perspective explains compulsions.
- Briefly explain how the biological perspective explains compulsions.

(6 points)

3. Researchers have been very interested in the way that various neurotransmitters affect psychological disorders. For each of the following neurotransmitters, describe one disorder that could be affected, and indicate whether the disorder is due to an abundance or scarcity of the neurotransmitter.

- Norepinephrine
- Serotonin
- Dopamine

(3 points)

UNIT XIII Treatment of Abnormal Behavior

Steve Debenport/Getty Images

MODULES

70 Introduction to Therapy, and Psychodynamic and Humanistic Therapies

71 Behavior, Cognitive, and Group Therapies

72 Evaluating Psychotherapies

73 The Biomedical Therapies and Preventing Psychological Disorders

Kay Redfield Jamison is both an award-winning clinical psychologist and a world expert on the emotional extremes of bipolar disorder. She knows her subject firsthand: “For as long as I can remember,” she recalled in *An Unquiet Mind*, “I was frighteningly, although often wonderfully, beholden to moods. Intensely emotional as a child, mercurial as a young girl, first severely depressed as an adolescent, and then unrelentingly caught up in the cycles of manic-depressive illness [now known as bipolar disorder] by the time I began my professional life, I became, both by necessity and intellectual inclination, a student of moods” (1995, pp. 4–5). Jamison’s life was blessed with times of intense sensitivity and passionate energy. But like her father’s, it was also sometimes plagued by reckless spending, racing conversation, and sleeplessness, alternating with swings into “the blackest caves of the mind.”

Then, “in the midst of utter confusion,” she made a life-changing decision. Risking professional embarrassment, she made an appointment with a therapist, a psychiatrist she would visit weekly for years to come.

> He kept me alive a thousand times over. He saw me through madness, despair, wonderful and terrible love affairs, disillusionments and triumphs, recurrences of illness, an almost fatal suicide attempt, the death of a man I greatly loved, and the enormous pleasures and aggravations of my professional life. . . . He was very tough, as well as very kind, and even though he understood more than anyone how much I felt I was losing—in energy, vivacity, and originality—by taking medication, he never [lost] sight of the overall perspective of how costly, damaging, and life threatening my illness was. . . . Although I went to him to be treated for an illness, he taught me . . . the total beholdenness of brain to mind and mind to brain (pp. 87–88).

“Psychotherapy heals,” Jamison reports. “It makes some sense of the confusion, reins in the terrifying thoughts and feelings, returns some control and hope and possibility from it all."

This unit explores some of the healing options available to therapists and the people who seek their help. We begin by exploring and evaluating *psychotherapies,* and then focus on *biomedical therapies* and preventing disorders.

▶ **Unit XIII Overview Video**

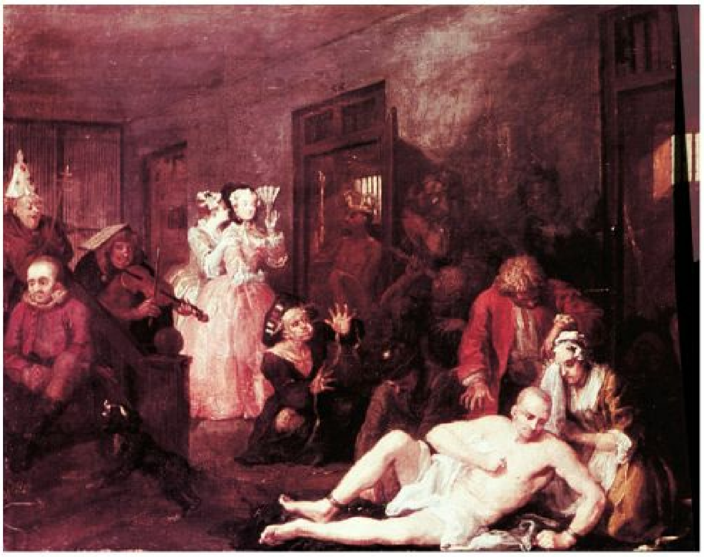
Module **70 Introduction to Therapy, and Psychodynamic and Humanistic Therapies**

LEARNING TARGETS

- 70-1 Contrast psychotherapy and the biomedical therapies.
- 70-2 Discuss the goals and techniques of psychoanalysis, and examine how they have been adapted in psychodynamic therapy.
- 70-3 Distinguish the basic themes of humanistic therapy, and describe the specific goals and techniques of Rogers' client-centered approach.

The long history of efforts to treat psychological disorders has included a bewildering mix of harsh and gentle methods. Would-be healers have cut holes in people's heads and restrained, bled, or "beat the devil" out of them. But they also have given warm baths and massages and placed people in sunny, serene environments. They have given them drugs. And they have talked with them about childhood experiences, current feelings, and maladaptive thoughts and behaviors.

Reformers Philippe Pinel (1745–1826) and Dorothea Dix (1802–1887) pushed for gentler, more humane treatments and for constructing mental hospitals. Their efforts largely paid off. Since the 1950s, the introduction of effective drug therapies and community-based treatment programs has emptied most of those hospitals.



The Granger Collection, NYC—All Rights Reserved.

The history of treatment Visitors to eighteenth-century mental hospitals paid to gawk at patients, as though they were viewing zoo animals. William Hogarth's (1697–1764) painting captured one of these visits to London's St. Mary of Bethlehem hospital (commonly called Bedlam).

Treating Psychological Disorders

70-1 How do psychotherapy and the biomedical therapies differ?

Modern Western therapies can be classified into two main categories.

- In **psychotherapy**, a trained therapist uses psychological techniques to assist someone seeking either to overcome difficulties or to achieve personal growth. The therapist may explore a client's early relationships, encourage the client to adopt new ways of thinking, or coach the client in replacing old behaviors with new ones.

psychotherapy

treatment involving psychological techniques; consists of interactions between a trained therapist and someone seeking to overcome psychological difficulties or achieve personal growth.

- **Biomedical therapy** offers medications and other biological treatments. For example, a person with severe depression may receive antidepressants, electroconvulsive shock therapy (ECT), or deep-brain stimulation.

biomedical therapy

prescribed medications or procedures that act directly on the person's physiology.

The care provider's training and expertise, as well as the disorder itself, influence the choice of treatment. Psychotherapy and medication are often combined. Kay Redfield Jamison received psychotherapy in her meetings with her psychiatrist, and she took medications to control her wild mood swings.

Let's look first at some influential psychotherapy options for those treated with "talk therapies." Each is built on one or more of psychology's major theories: psychodynamic, humanistic, behavioral, and cognitive.

Most of these techniques can be used one-on-one or in groups. Some therapists combine techniques. Indeed, many psychotherapists describe their approach as **eclectic**, using a blend of therapies. We'll explore psychodynamic and humanistic therapies in this module, and behavior, cognitive, and group therapies in Module 71.

eclectic approach

an approach to psychotherapy that uses techniques from various forms of therapy.

AP® EXAM TIP

Most of the treatments discussed in this unit come from the perspectives you've been learning about since Unit I (Psychology's History and Approaches). As you reach each major section—like the upcoming one on psychoanalytic and psychodynamic therapy—try to anticipate how someone from that perspective would approach therapy (for example, "What would Freud do?"). This should help you organize and retain the information as you read.

Psychoanalysis and Psychodynamic Therapies

70-2 What are the goals and techniques of psychoanalysis, and how have they been adapted in psychodynamic therapy?

The first major psychological therapy was Sigmund Freud’s **psychoanalysis**. Although few clinicians today practice therapy as Freud did, his work deserves discussion. It helped form the foundation for treating psychological disorders, and it continues to influence modern therapists working from the *psychodynamic* perspective.

psychoanalysis

Sigmund Freud’s therapeutic technique. Freud believed the patient’s free associations, resistances, dreams, and transferences—and the therapist’s interpretations of them—released previously repressed feelings, allowing the patient to gain self-insight.

AP® EXAM TIP

As you read, think about the various disorders previously studied and consider how a particular form of therapy might be most effective in treating that disorder.

The Goals of Psychoanalysis

Freud believed that in therapy, people could achieve healthier, less anxious living by releasing the energy they had previously devoted to id-ego-superego conflicts (see Module 55). Freud assumed that we do not fully know ourselves. He believed that there are threatening things we *repress*—things we do not want to know, so we disavow or deny them. Psychoanalysis was Freud’s method of helping people to bring these repressed feelings into conscious awareness. By helping them reclaim their unconscious thoughts and feelings, and by giving them *insight* into the origins of their disorders, the therapist *(analyst)* could help them reduce growth-impeding inner conflicts.

The Techniques of Psychoanalysis

Psychoanalytic theory emphasizes the power of childhood experiences to mold the adult. Thus, psychoanalysis is historical reconstruction. It aims to unearth the past in the hope of loosening its bonds on the present. After discarding hypnosis as an unreliable excavator, Freud turned to *free association.*

Imagine yourself as a patient using free association. You begin by relaxing, perhaps by lying on a couch. The psychoanalyst, who sits out of your line of vision, asks you to say aloud whatever comes to mind. At one moment, you're relating a childhood memory. At another, you're describing a dream or recent experience. It sounds easy, but soon you notice how often you edit your thoughts as you speak. You pause for a second before uttering an embarrassing thought. You omit what seems trivial, irrelevant, or shameful. Sometimes your mind goes blank or you clutch up, unable to remember important details. You may joke or change the subject to something less threatening.

To the analyst, these mental blocks indicate **resistance**. They hint that anxiety lurks and you are defending against sensitive material. The analyst will note your resistance and then provide insight into its meaning. If offered at the right moment, this **interpretation**—of, say, your not wanting to talk about your mother or call, text, or message her—may illuminate the underlying wishes, feelings, and conflicts you are avoiding. The analyst may also offer an explanation of how this resistance fits with other pieces of your psychological puzzle, including those based on analysis of your dream content.

resistance

in psychoanalysis, the blocking from consciousness of anxiety-laden material.

interpretation

in psychoanalysis, the analyst’s noting supposed dream meanings, resistances, and other significant behaviors and events in order to promote insight.

Over many such sessions, your relationship patterns surface in your interaction with your therapist. You may find yourself experiencing strong positive or negative feelings for your analyst. The analyst may suggest you are **transferring** feelings, such as dependency or mingled love and anger, that you experienced in earlier relationships with family members or other important people. By exposing such feelings, you may gain insight into your current relationships.

transference

in psychoanalysis, the patient’s transfer to the analyst of emotions linked with other relationships (such as love or hatred for a parent).

Relatively few North American therapists now offer traditional psychoanalysis. Much of its underlying theory is not supported by scientific research (Module 56). Analysts’ interpretations cannot be proven or disproven. And psychoanalysis takes considerable time and money, often years of several sessions per week. Some of these problems have been addressed in the modern *psychodynamic perspective* that has evolved from psychoanalysis.

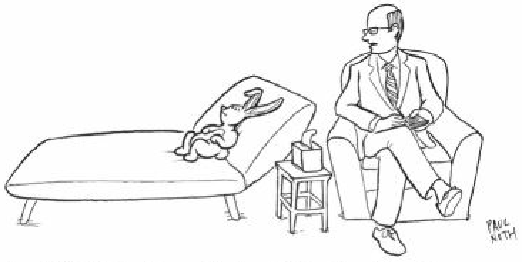
> “*I haven’t seen my analyst in 200 years. He was a strict Freudian. If I’d been going all this time, I’d probably almost be cured by now.*”
>
> *Woody Allen, after awakening from suspended animation in the movie* Sleeper

Psychodynamic Therapy

Although influenced by Freud’s ideas, **psychodynamic therapists** don’t talk much about id-ego-superego conflicts. Instead they try to help people understand their current symptoms by focusing on important relationships, including childhood experiences and the therapist-client relationship. “We can have loving feelings and hateful feelings toward the same person,” noted psychodynamic therapist Jonathan Shedler (2009), and “we can desire something and also fear it.” Client-therapist meetings take place once or twice a week (rather than several times weekly) and often for only a few weeks or months. Rather than lying on a couch, out of the therapist’s line of vision, clients meet with their therapist face-to-face and gain perspective by exploring defended-against thoughts and feelings.

psychodynamic therapy

therapy deriving from the psychoanalytic tradition; views individuals as responding to unconscious forces and childhood experiences, and seeks to enhance self-insight.



Paul Noth/The New Yorker Collection/The Cartoon Bank

“I’m more interested in hearing about the eggs you’re hiding from yourself.”

Therapist David Shapiro (1999, p. 8) illustrated this with the case of a young man who had told women that he loved them, when he knew that he didn’t. The client’s explanation: They expected it, so he said it. But with his wife, who wished he would say that he loved her, he found he *couldn’t* do that—“I don’t know why, but I can’t.”

Therapist: Do you mean, then, that if you could, you would like to?

Patient: Well, I don’t know. . . . Maybe I can’t say it because I’m not sure it’s true. Maybe I don’t love her.

Further interactions revealed that the client could not express real love because it would feel “mushy” and “soft” and therefore unmanly. He was “in conflict with himself, and . . . cut off from the nature of that conflict.” Shapiro noted that with such patients, who are estranged from themselves, therapists using psychodynamic techniques “are in a position to introduce them to themselves. We can restore their awareness of their own wishes and feelings, and their awareness, as well, of their reactions against those wishes and feelings.”

Exploring past relationship troubles may help clients understand the origin of their current difficulties. Shedler (2010a) recalled “Jeffrey’s” complaints of difficulty getting along with his colleagues and wife, who saw him as hypercritical. Jeffrey then “began responding to me as if I were an unpredictable, angry adversary.” Shedler seized this opportunity to help Jeffrey recognize the relationship pattern and its roots in the attacks and humiliation he had experienced from his alcohol-abusing father. Jeffrey was then able to work through and let go of this defensive style of responding to people. Thus, without embracing all of Freud’s theory, psychodynamic therapists aim to help people gain insight into unconscious dynamics that arise from their life experience.

Humanistic Therapies

70-3 What are the basic themes of humanistic therapy? What are the specific goals and techniques of Rogers' client-centered approach?

The *humanistic* perspective (Module 57) emphasizes people's innate potential for self-fulfillment. Not surprisingly, humanistic therapies attempt to reduce the inner conflicts that interfere with natural development and growth. To achieve this goal, humanistic therapists try to give clients new insights. Indeed, because they share this goal, the psychodynamic and humanistic therapies are often referred to as **insight therapies**. But humanistic therapies differ from psychodynamic therapies in many other ways:

insight therapies
therapies that aim to improve psychological functioning by increasing a person's awareness of underlying motives and defenses.

- *Humanistic therapists aim to boost people's self-fulfillment by helping them grow in self-awareness and self-acceptance.*
- *Promoting this growth, not curing illness, is the therapy focus.* Thus, those in therapy have become "clients" or just "persons" rather than "patients" (a change many other therapists adopted).
- *The path to growth is taking immediate responsibility for one's feelings and actions, rather than uncovering hidden determinants.*
- *Conscious thoughts are more important than the unconscious.*
- *The present and future are more important than the past.* Therapy thus focuses on exploring feelings as they occur, rather than on achieving insights into the childhood origins of those feelings.

All these themes are present in the widely used humanistic technique that Carl Rogers (1902–1987) developed and called **client-centered therapy**. In this *nondirective therapy*, the client leads the discussion. The therapist listens, without judging or interpreting, and refrains from directing the client toward certain insights. Believing that most people possess the resources for growth, Rogers (1961, 1980) encouraged therapists to foster that growth by exhibiting *acceptance*, *genuineness*, and *empathy*. When therapists enable their clients to feel unconditionally accepted, drop their facades and genuinely express their true feelings, and empathically sense and reflect their clients' feelings, the clients may deepen their self-understanding and self-acceptance (Hill & Nakayama, 2000). As Rogers (1980, p. 10) explained,

client-centered therapy

a humanistic therapy, developed by Carl Rogers, in which the therapist uses techniques such as *active listening* within an accepting, genuine, empathic environment to facilitate clients' growth. (Also called *person-centered therapy*.)

> Hearing has consequences. When I truly hear a person and the meanings that are important to him at that moment, hearing not simply his words, but him, and when I let him know that I have heard his own private personal meanings, many things happen. There is first of all a grateful look. He feels released. He wants to tell me more about his world. He surges forth in a new sense of freedom. He becomes more open to the process of change.
>
> I have often noticed that the more deeply I hear the meanings of the person, the more there is that happens. Almost always, when a person realizes he has been deeply heard, his eyes moisten. I think in some real sense he is weeping for joy. It is as though he were saying, "Thank God, somebody heard me. Someone knows what it's like to be me."

AP® EXAM TIP

You can remember *A*cceptance, *G*enuineness, and *E*mpathy as “AGE.”

> “*We have two ears and one mouth that we may listen the more and talk the less.*”
>
> *Zeno, 335–263* B.C.E., Diogenes Laertius

To Rogers, “hearing” was **active listening**. The therapist echoes, restates, and seeks clarification of what the person expresses (verbally or nonverbally) and acknowledges those expressed feelings. Active listening is now an accepted part of counseling practices in many schools, colleges, and clinics. Counselors listen attentively. They interrupt only to restate and confirm feelings, to accept what is being expressed, or to seek clarification. In the following brief excerpt, note how Rogers tried to provide a psychological mirror that would help the client see himself more clearly.

active listening

empathic listening in which the listener echoes, restates, and clarifies. A feature of Rogers’ client-centered therapy.

Michael Rougier/Getty Images

Active listening Carl Rogers (right) empathized with a client during this group therapy session.

> **Rogers:** Feeling that now, hm? That you’re just no good to yourself, no good to anybody. Never will be any good to anybody. Just that you’re completely worthless, huh?—Those really are lousy feelings. Just feel that you’re no good at all, hm?
>
> **Client:** Yeah. *(Muttering in low, discouraged voice)* That’s what this guy I went to town with just the other day told me.
>
> **Rogers:** This guy that you went to town with really told you that you were no good? Is that what you’re saying? Did I get that right?
>
> **Client:** M-hm.
>
> **Rogers:** I guess the meaning of that if I get it right is that here’s somebody that—meant something to you and what does he think of you? Why, he’s told you that he thinks you’re no good at all. And that just really knocks the props out from under you. *(Client weeps quietly.)* It just brings the tears. *(Silence of 20 seconds)*
>
> **Client:** *(Rather defiantly)* I don’t care though.
>
> **Rogers:** You tell yourself you don’t care at all, but somehow I guess some part of you cares because some part of you weeps over it.
>
> (*Meador & Rogers, 1984, p. 167*)

Can a therapist be a perfect mirror, without selecting and interpreting what is reflected? Rogers conceded that one cannot be *totally* nondirective. Nevertheless, he said, the therapist’s most important contribution is to accept and understand the client. Given a nonjudgmental, grace-filled environment that provides **unconditional positive regard**, people may accept even their worst traits and feel valued and whole.

unconditional positive regard

a caring, accepting, nonjudgmental attitude, which Carl Rogers believed would help clients develop self-awareness and self-acceptance.

How can we improve communication in our own relationships by listening more actively? Three Rogers-inspired hints may help:

1. ***Paraphrase.*** Check your understanding by summarizing the person’s words out loud, in your own words.
2. ***Invite clarification***. “What might be an example of that?” may encourage the person to say more.
3. ***Reflect feelings***. “It sounds frustrating” might mirror what you’re sensing from the person’s body language and intensity.

Check Your Understanding

Ask Yourself

- Think of your closest friends. Do they tend to express more empathy than those you don’t feel as close to? How have your own active-listening skills changed as you’ve gotten older?

Test Yourself

- In psychoanalysis, when patients experience strong feelings for their therapist, this is called ______________. Patients are said to demonstrate anxiety when they put up mental blocks around sensitive memories, indicating ______________. The therapist will attempt to provide insight into the underlying anxiety by offering a(n) ______________ of the mental blocks.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 70 REVIEW

70-1 How do psychotherapy and the biomedical therapies differ?

- *Psychotherapy* is treatment involving psychological techniques; it consists of interactions between a trained therapist and someone seeking to overcome psychological difficulties or achieve personal growth.
- The major psychotherapies derive from psychology's psychodynamic, humanistic, behavioral, and cognitive perspectives.
- An *eclectic approach* combines techniques from various forms of psychotherapy.
- *Biomedical therapy* treats psychological disorders with medications or procedures that act directly on a patient's physiology.

70-2 What are the goals and techniques of psychoanalysis, and how have they been adapted in psychodynamic therapy?

- Through *psychoanalysis*, Sigmund Freud tried to give people self-insight and relief from their disorders by bringing anxiety-laden feelings and thoughts into conscious awareness.
    - Techniques included using free association and *interpretation* of instances of *resistance* and *transference*.
- Contemporary *psychodynamic therapy* has been influenced by traditional psychoanalysis but is briefer, less expensive, and more focused on helping the client find relief from current symptoms.
    - Therapists help clients understand themes that run through past and current relationships.

70-3 What are the basic themes of humanistic therapy? What are the specific goals and techniques of Rogers' client-centered approach?

- Both psychoanalytic and humanistic therapies are *insight therapies*—they attempt to improve functioning by increasing clients' awareness of motives and defenses.
- Humanistic therapy's goals have included helping clients grow in self-awareness and self-acceptance, promoting personal growth rather than curing illness, helping clients take responsibility for their own growth, focusing on conscious thoughts rather than unconscious motivations, and seeing the present and future as more important than the past.
- Carl Rogers' *client-centered therapy* proposed that therapists' most important contributions are to function as a psychological mirror through *active listening* and to provide a growth-fostering environment of *unconditional positive regard*, characterized by acceptance, genuineness, and empathy.

Multiple-Choice Questions

1. Dr. Carlson advises his depressed patients to discuss their childhood as well as their present lives. He also prescribes medications for them. His therapeutic style would be best described as

a. eclectic.
b. biomedical.
c. psychoanalytic.
d. transference.
e. psychodynamic.

2. What do psychodynamic therapists call the blocking of anxiety-laden material from conscious awareness?

a. Resistance
b. Interpretation
c. Transference
d. Face-to-face therapy
e. Interpersonal psychotherapy

3. Which of the following is one of the ways humanistic therapies differ from psychoanalytic therapies?

a. Humanistic therapies believe the past is more important than the present and future.
b. Humanistic therapies boost self-fulfillment by decreasing self-acceptance.
c. Humanistic therapies believe the path to growth is found by uncovering hidden determinants.
d. Humanistic therapies believe that unconscious thoughts are more important than conscious thoughts.
e. Humanistic therapies focus on promoting growth, not curing illness.

4. No matter how embarrassing her discussions with her therapist might be, Jenny recognizes that he always treats her with respect. This acceptance illustrates the client-centered technique of

a. free association.
b. active listening.
c. resistance.
d. Freudian interpretation.
e. unconditional positive regard.

Practice FRQs

1. Explain what psychoanalysis is, and then give an example of how transference and resistance would affect this therapy.

Answer

1 point: Psychoanalysis is a Freudian therapy that seeks to get patients to release repressed feelings to gain self-insight. Page 723

1 point: Transference happens when a patient shifts emotions linked with other relationships to the analyst. This can help the patient gain insight into those relationships. For example, a patient feeling angry at a sibling may transfer that to feeling angry at the therapist. Page 724

1 point: Resistance happens when a patient blocks anxiety-laden thoughts and memories from consciousness. For example, patients may find themselves avoiding discussion of their most traumatic memories.

↪ Page 723

2. Explain what client-centered therapy is, then describe the major techniques of the therapy.

(3 points)

Module **71 Behavior, Cognitive, and Group Therapies**

LEARNING TARGETS

- 71-1 Analyze how the basic assumption of behavior therapy differs from the assumptions of psychodynamic and humanistic therapies, and examine the techniques used in exposure therapies and aversive conditioning.
- 71-2 Describe the main premise of therapy based on operant conditioning principles, and contrast the views of its proponents and critics.
- 71-3 Discuss the goals and techniques of the cognitive therapies and of cognitive-behavioral therapy.
- 71-4 Discuss the aims and benefits of group and family therapies.

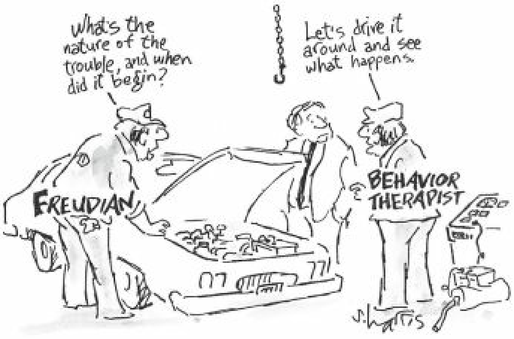
Behavior Therapies

71-1 How does the basic assumption of behavior therapy differ from the assumptions of psychodynamic and humanistic therapies? What techniques are used in exposure therapies and aversive conditioning?

The insight therapies assume that self-awareness and psychological well-being go hand in hand. Psychodynamic therapists expect people’s problems to diminish as they gain insight into their unresolved and unconscious tensions. Humanistic therapists expect problems to diminish as people get in touch with their feelings. **Behavior therapists**, however, doubt the healing power of self-awareness. Rather than delving deeply below the surface looking for inner causes, behavior therapists assume that problem behaviors *are* the problems. (You can become aware of why you are highly anxious during tests and still be anxious.) If phobias, sexual dysfunctions, or other maladaptive symptoms are learned behaviors, why not apply learning principles to replace them with new, constructive behaviors?

behavior therapy

therapy that applies learning principles to the elimination of unwanted behaviors.


What's the nature of the trouble, and when did it begin?
Let's drive it around and see what happens.
FREUDIAN
BEHAVIOR THERAPIST

Sidney Harris/ScienceCartoonsPlus.com

Classical Conditioning Techniques

One cluster of behavior therapies derives from principles developed in Ivan Pavlov's early twentieth-century conditioning experiments (Module 26). As Pavlov and others showed, we learn various behaviors and emotions through classical conditioning. If we're attacked by a dog, we may thereafter have a conditioned fear response when other dogs approach. (Our fear generalizes, and all dogs become conditioned stimuli.)

Could maladaptive symptoms be examples of conditioned responses? If so, might reconditioning be a solution? Learning theorist O. H. Mowrer thought so. He developed a successful conditioning therapy for chronic bed-wetters, using a liquid-sensitive pad connected to an alarm. If the sleeping child wets the bed pad, moisture triggers the alarm, waking the child. After a number of trials, the child associates bladder relaxation with waking. In three out of four cases, the treatment has been effective and the success boosted the child's self-image (Christophersen & Edwards, 1992; Houts et al., 1994).

Can we unlearn fear responses, such as to public speaking or flying, through new conditioning? Many people have. An example: The fear of riding in an elevator is often a learned aversion to being in a confined space. **Counterconditioning**, such as with *exposure therapy*, pairs the trigger stimulus (in this case, the enclosed space of the elevator) with a new response (relaxation) that is incompatible with fear.

counterconditioning

behavior therapy procedures that use classical conditioning to evoke new responses to stimuli that are triggering unwanted behaviors; include *exposure therapies* and *aversive conditioning.*

Exposure Therapies

Picture this scene: Behavioral psychologist Mary Cover Jones is working with 3-year-old Peter, who is petrified of rabbits and other furry objects. To rid Peter of his fear, Jones plans to associate the fear-evoking rabbit with the pleasurable, relaxed response associated with eating. As Peter begins his midafternoon snack, she introduces a caged rabbit on the other side of the huge room. Peter, eagerly munching away on his crackers and drinking his milk, hardly notices. On succeeding days, she gradually moves the rabbit closer and closer. Within two months, Peter is holding the rabbit in his lap, even stroking it while he eats. Moreover, his fear of other furry objects subsides as well, having been *countered*, or replaced, by a relaxed state that cannot coexist with fear (Fisher, 1984; Jones, 1924).

AP® EXAM TIP

Before you read the next several pages of this module, you may want to quickly review the material on classical and operant conditioning in Unit VI (Learning). Note that behavior therapists, like psychodynamic therapists, focus on childhood experiences, but in a different way. Behavior therapists acknowledge that conditioned responses may result from childhood experiences; psychodynamic therapists instead work on resolving unconscious conflicts stemming from childhood.

Unfortunately for many who might have been helped by Jones’ counterconditioning procedures, her story of Peter and the rabbit did not enter psychology’s lore when it was reported in 1924. It was more than 30 years before psychiatrist Joseph Wolpe (1958; Wolpe & Plaud, 1997) refined Jones’ counterconditioning technique into the **exposure therapies** used today. These therapies, in a variety of ways, try to change people’s reactions by repeatedly exposing them to stimuli that trigger unwanted reactions. With repeated exposure to what they normally avoid or escape, people adapt. We all experience this process in everyday life. A person moving to a new apartment may be annoyed by nearby loud traffic noise, but only for a while. The person adapts. So, too, with people who have fear reactions to specific events. Exposed repeatedly to the situation that once petrified them, with support from talk therapy, they can learn to react less anxiously (Barrera et al., 2013; Foa & McLean, 2016).

exposure therapies

behavioral techniques, such as *systematic desensitization* and *virtual reality exposure therapy*, that treat anxieties by exposing people (in imaginary or actual situations) to the things they fear and avoid.

One exposure therapy used to treat phobias is **systematic desensitization**. You cannot simultaneously be anxious and relaxed. Therefore, if you can repeatedly relax when facing anxiety-provoking stimuli, you can gradually eliminate your anxiety. The trick is to proceed gradually. If you fear public speaking, a behavior therapist might first help you construct a hierarchy of anxiety-triggering speaking situations. Yours might range from mildly anxiety-provoking situations (perhaps speaking up in a small group of friends) to panic-provoking situations (having to address a large audience).

systematic desensitization

a type of exposure therapy that associates a pleasant relaxed state with gradually increasing anxiety-triggering stimuli. Commonly used to treat phobias.

Next, the therapist would train you in *progressive relaxation.* You would learn to release tension in one muscle group after another, until you achieve a comfortable, complete relaxation. Then the therapist might ask you to imagine, with your eyes closed, a mildly anxiety-arousing situation: You are having coffee with a group of friends and are trying to decide whether to speak up. If imagining the scene causes you to feel any anxiety, you will signal by raising your finger. Seeing the signal, the therapist will instruct you to switch off the mental image and go back to deep relaxation. This imagined scene is repeatedly paired with relaxation until you feel no trace of anxiety.

The therapist will then move to the next item in your anxiety hierarchy, again using relaxation techniques to desensitize you to each imagined situation. After several sessions, you move to actual situations and practice what you had only *imagined* before, beginning with relatively easy tasks and gradually moving to more anxiety-filled ones. Conquering your anxiety in an actual situation, not just in your imagination, will increase your self-confidence (Foa & Kozak, 1986; Williams, 1987). Eventually, you may even become a confident public speaker. Often people fear not just a situation, such as public speaking, but also being incapacitated by their own fear response. As their fear subsides, so also does their fear of the fear.

> “*The only thing we have to fear is fear itself.*”
>
> *U.S. President Franklin D. Roosevelt First inaugural address, 1933*

If an anxiety-arousing situation is too expensive, difficult, or embarrassing to re-create, the therapist may recommend **virtual reality exposure therapy**. You would don a head-mounted display unit that projects a three-dimensional virtual world. The lifelike scenes, which shift as your head turns, would be tailored to your particular fear. Experimentally treated fears include flying, heights, particular animals, and public speaking (Parsons & Rizzo, 2008). If you fear flying, you could peer out a virtual window of a simulated plane, feel the engine’s vibrations, and hear it roar as the plane taxis down the runway and takes off. In controlled studies, people participating in virtual reality exposure therapy have experienced significant relief from real-life fear (Turner & Casey, 2014).

virtual reality exposure therapy

a counterconditioning technique that treats anxiety through creative electronic simulations in which people can safely face their greatest fears, such as airplane flying, spiders, or public speaking.

Left: Jack Kearse/Emory University; Right: William Britten/E+/Getty Images

Virtual reality exposure therapy Within the confines of a room, virtual reality technology exposes people to vivid simulations of feared stimuli, such as walking across a rickety bridge high off the ground.

Aversive Conditioning

An exposure therapy enables a more relaxed, positive response to an upsetting *harmless* stimulus. It helps you accept what you *should* do. **Aversive conditioning** creates a negative (aversive) response to a *harmful* stimulus (such as alcohol). It helps you to learn what you *should not* do. The aversive conditioning procedure is simple: It associates the unwanted behavior with unpleasant feelings. To treat nail biting, the therapist may suggest painting the fingernails with a nasty-tasting nail polish (Baskind, 1997). To treat alcohol use disorder, the therapist may offer the client appealing drinks laced with a drug that produces severe nausea (recall the taste-aversion experiments with rats and coyotes in Module 29). If that therapy links alcohol with violent nausea, the person's reaction to alcohol may change from positive to negative (**Figure 71.1**).

aversive conditioning

a type of counterconditioning that associates an unpleasant state (such as nausea) with an unwanted behavior (such as drinking alcohol).

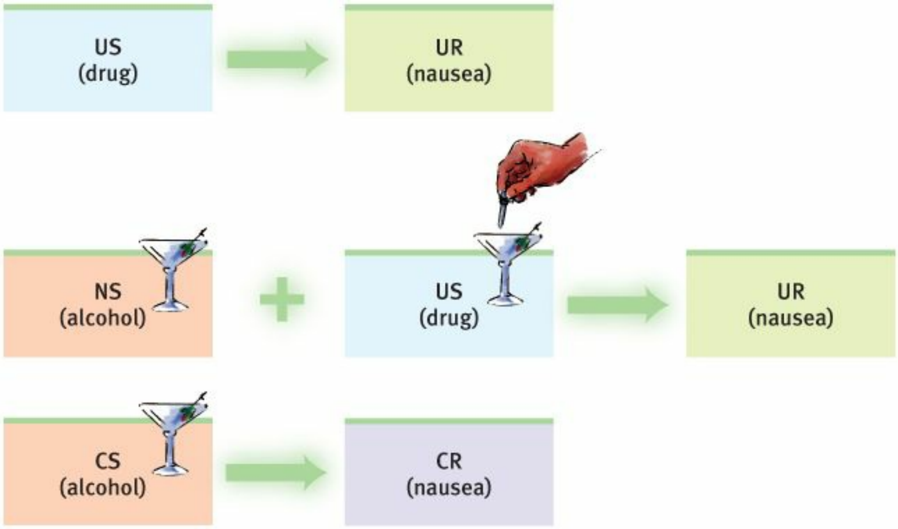


Figure 71.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 71.1 Aversion therapy for alcohol use disorder

After repeatedly imbibing an alcoholic drink mixed with a drug that produces severe nausea, some people with a history of alcohol use disorder develop at least a temporary conditioned aversion to alcohol. (Remember: US is unconditioned stimulus, UR is unconditioned response, NS is neutral stimulus, CS is conditioned stimulus, and CR is conditioned response.)

Flip It Video: Counterconditioning—How It Works

Taste aversion learning has been a successful alternative to killing predators in some animal protection programs (Dingfelder, 2010; Garcia & Gustavson, 1997). After being sickened by eating a contaminated sheep, wolves may avoid sheep. Does aversive conditioning also transform humans' reactions to alcohol? In the short run it may. In one classic study, 685 hospital patients with alcohol use disorder completed an aversion therapy program (Wiens & Menustik, 1983). Over the next year, they returned for several booster treatments that paired alcohol with sickness. At the end of that year, 63 percent were not drinking alcohol. But after three years, only 33 percent were alcohol free.

In therapy, as in research, cognition influences conditioning. People know that outside the therapist's office they can drink without fear of nausea. Just as animals learn to expect how often they will experience an unconditioned stimulus (Rescorla & Wagner, 1972), people can learn a probability that drinking will lead to nausea. This ability to discriminate between the therapy situation and all others can limit aversive conditioning’s effectiveness. Thus, therapists often combine aversive conditioning with other treatments.

Operant Conditioning Techniques

71-2 What is the main premise of therapy based on operant conditioning principles, and what are the views of its proponents and critics?

If you have learned to swim, you learned how to put your head under water without suffocating, how to pull your body through the water, and perhaps even how to dive safely. Operant conditioning shaped your swimming. You were reinforced for safe, effective behaviors. And you were naturally punished, as when you swallowed water, for improper swimming behaviors.

Pioneering researcher B. F. Skinner helped us understand the basic principle of operant conditioning (Modules 27 and 28): Consequences strongly influence our voluntary behaviors. Knowing this, behavior therapists can practice *behavior modification.* They reinforce behaviors they consider desirable, and they fail to reinforce—or sometimes punish—behaviors they consider undesirable.

Using operant conditioning to solve specific behavior problems has raised hopes for some seemingly hopeless cases. Children with intellectual disabilities have been taught to care for themselves. Socially withdrawn children with autism spectrum disorder (ASD) have learned to interact. People with schizophrenia have been helped to behave more rationally in their hospital ward. In such cases, therapists used positive reinforcers to *shape* behavior. In a step-by-step manner, they rewarded closer and closer approximations of the desired behavior.

In extreme cases, treatment must be intensive. One study worked with 19 withdrawn, uncommunicative 3-year-olds with ASD. For two years, 40 hours each week, the children’s parents attempted to shape their behavior (Lovaas, 1987). They positively reinforced desired behaviors and ignored or punished aggressive and self-abusive behaviors. The combination worked wonders for some children. By first grade, 9 of the 19 were functioning successfully in school and exhibiting normal intelligence. In a group of 40 comparable children not undergoing this effortful treatment, only one showed similar improvement. Later studies focused on positive reinforcement—the effective aspect of this early intensive behavioral intervention (Reichow, 2012).

Rewards used to modify behavior vary. For some people, the reinforcing power of attention or praise is sufficient. Others require concrete rewards, such as food. In institutional settings, therapists may create a **token economy**. When people display a desired behavior, such as getting out of bed, washing, dressing, eating, talking coherently, cleaning up their rooms, or playing cooperatively, they receive a token or plastic coin. Later, they can exchange a number of these tokens for rewards, such as candy, TV time, day trips, or better living quarters. Token economies have been used successfully in homes, classrooms, and detention facilities, and among people with various disabilities (Matson & Boisjoli, 2009).

token economy

an operant conditioning procedure in which people earn a token for exhibiting a desired behavior and can later exchange tokens for privileges or treats.

Behavior modification critics express two concerns:

- *How durable are the behaviors?* Will people become so dependent on extrinsic rewards that the desired behaviors will stop when reinforcers stop? Behavior modification advocates believe the behaviors will endure if therapists wean people from the tokens by shifting them toward other, real-life rewards, such as social approval. Further, they point out, the desired behaviors themselves can be rewarding. As people become more socially competent, the intrinsic satisfactions of social interaction may sustain the behaviors.

- *Is it right for one human to control another's behavior?* Those who set up token economies deprive people of something they desire and decide which behaviors to reinforce. To critics, this whole process feels too authoritarian. Advocates reply that control already exists: People's destructive behavior patterns are being maintained and perpetuated by natural reinforcers and punishers in their environments. Isn't using positive rewards to reinforce adaptive behavior more humane than institutionalizing or punishing people? Advocates also argue that the right to effective treatment and an improved life justifies temporary deprivation.

Check Your Understanding

Ask Yourself

- Have you had any experience with behavior therapy techniques in your own life, perhaps to eliminate some childhood behavior problem or to shape some good behavior? Were they effective?

Test Yourself

- What might a psychodynamic therapist say about Mowrer's therapy for bed-wetting? How might a behavior therapist defend it?
- Some maladaptive behaviors are learned. What hope does this fact provide?
- Exposure therapies and aversive conditioning are applications of _______________ conditioning. Token economies are an application of _______________ conditioning.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Cognitive Therapies

71-3 What are the goals and techniques of the cognitive therapies and of cognitive-behavioral therapy?

People with specific fears and problem behaviors may respond to behavior therapy. But how might behavior therapists modify the wide assortment of behaviors that accompany depressive disorders? Or treat people with generalized anxiety disorder, where unfocused anxiety doesn’t lend itself to a neat list of anxiety-triggering situations? The *cognitive revolution* that has profoundly changed other areas of psychology during the last half-century has influenced therapy as well (Module 2).

The **cognitive therapies** assume that our thinking colors our feelings (**Figure 71.2**). Between an event and our response lies the mind. Self-blaming and overgeneralized explanations of bad events feed depression (Module 67). Anxiety arises from an “attention bias to threat” (MacLeod & Clarke, 2015). If depressed, we may interpret a suggestion as criticism, disagreement as dislike, praise as flattery, friendliness as pity. Dwelling on such thoughts sustains negative thinking. Cognitive therapies aim to help people change their mind with new, more constructive ways of perceiving and interpreting events (Kazdin, 2015).

cognitive therapy

therapy that teaches people new, more adaptive ways of thinking; based on the assumption that thoughts intervene between events and our emotional reactions.

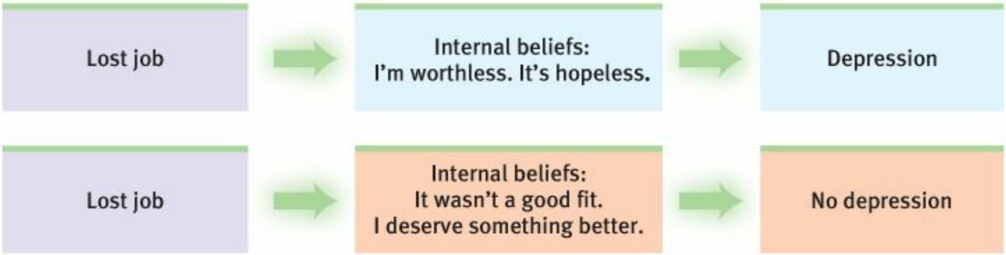


Figure 71.2

Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 71.2 A cognitive perspective on psychological disorders

The person’s emotional reactions are produced not directly by the event but by the person’s thoughts in response to the event.

Rational-Emotive Behavior Therapy

According to Albert Ellis (1962, 1987, 1993), the creator of **rational-emotive behavior therapy (REBT)**, many problems arise from irrational thinking. For example, he described how therapy might challenge one client’s illogical, self-defeating assumptions (Ellis, 2011, pp. 198–199):

> [She] does not merely believe it is undesirable if her lover rejects her. She tends to believe, also, that (a) it is awful; (b) she cannot stand it; (c) she should not, must not be rejected; (d) she will never be accepted by any desirable partner; (e) she is a worthless person because one lover has rejected her; and (f) she deserves to be rejected for being so worthless. Such common covert [hidden] hypotheses are illogical, unrealistic, and destructive. . . . They can be easily elicited and demolished by any scientist worth his or her salt; and the rational-emotive therapist is exactly that: an exposing and nonsense-annihilating scientist.

rational-emotive behavior therapy (REBT)

a confrontational cognitive therapy, developed by Albert Ellis, that vigorously challenges people’s illogical, self-defeating attitudes and assumptions.

AP® EXAM TIP

Behavior therapies focus on what we do. Cognitive therapies focus on what we think. That’s a very basic distinction, but it is critically important for your understanding.

Change people's thinking by revealing the "absurdity" of their self-defeating ideas, the sharp-tongued Ellis believed, and you will change their self-defeating feelings and enable healthier behaviors.

Beck's Therapy for Depression

In the late 1960s, a woman left a party early. Things had not gone well. She felt disconnected from the other party-goers and assumed no one cared for her. A few days later, she visited therapist Aaron Beck. Rather than go down the traditional path to her childhood, Beck challenged her thinking. After she then listed a dozen people who *did* care for her, Beck realized that challenging people's automatic negative thoughts could be therapeutic. And thus was born his cognitive therapy, which assumes that changing people's thinking can change their functioning (Spiegel, 2015).

> "*Life does not consist mainly, or even largely, of facts and happenings. It consists mainly of the storm of thoughts that are forever blowing through one's mind.*"
>
> *Mark Twain, 1835–1910*

Depressed people, Beck found, often reported dreams with negative themes of loss, rejection, and abandonment. These thoughts extended into their waking thoughts, and even into therapy, as clients recalled and rehearsed their failings and worst impulses (Kelly, 2000). With cognitive therapy, Beck and his colleagues (1979) sought to reverse clients' negativity about themselves, their situations, and their futures. With this technique, gentle questioning seeks to reveal irrational thinking, and then to persuade people to remove the dark glasses through which they view life (Beck et al., 1979, pp. 145–146):

Client: I agree with the descriptions of me but I guess I don't agree that the way I think makes me depressed.

Beck: How do you understand it?

Client: I get depressed when things go wrong. Like when I fail a test.

Beck: How can failing a test make you depressed?

Client: Well, if I fail I'll never get into law school.

Beck: So failing the test means a lot to you. But if failing a test could drive people into clinical depression, wouldn't you expect everyone who failed the test to have a depression? . . . Did everyone who failed get depressed enough to require treatment?

Client: No, but it depends on how important the test was to the person.

Beck: Right, and who decides the importance?

Client: I do.

Beck: And so, what we have to examine is your way of viewing the test (or the way that you think about the test) and how it affects your chances of getting into law school. Do you agree?

Client: Right.

Beck: Do you agree that the way you interpret the results of the test will affect you? You might feel depressed, you might have trouble sleeping, not feel like eating, and you might even wonder if you should drop out of the course.

Client: I have been thinking that I wasn't going to make it. Yes, I agree.

Beck: Now what did failing mean?

Client: *(tearful)* That I couldn't get into law school.

Beck: And what does that mean to you?

Client: That I'm just not smart enough.

Beck: Anything else?

Client: That I can never be happy.

Beck: And how do these thoughts make you feel?

Client: Very unhappy.

Beck: So it is the meaning of failing a test that makes you very unhappy. In fact, believing that you can never be happy is a powerful factor in producing unhappiness. So, you get yourself into a trap—by definition, failure to get into law school equals "I can never be happy."

We often think in words. Therefore, getting people to change what they say to themselves is an effective way to change their thinking. Perhaps you can identify with the anxious students who, before a test, make matters worse with self-defeating thoughts: "This test's probably going to be impossible. Everyone seems so relaxed and confident. I wish I were better prepared. I'm so nervous I'll forget everything." Psychologists call this sort of relentless, overgeneralized, self-blaming behavior *catastrophizing.*

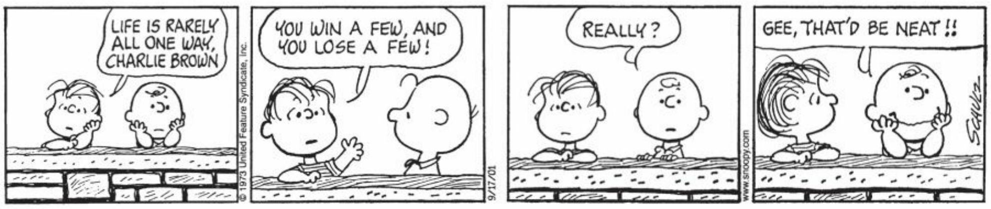
To change such negative self-talk, therapists have offered *stress inoculation training:* teaching people to restructure their thinking in stressful situations (Meichenbaum, 1977, 1985). Sometimes it may be enough simply to say more positive things to oneself: "Relax. The test may be hard, but it will be hard for everyone else, too. I studied harder than most people. Besides, I don't need a perfect score to get a good grade." After learning to "talk back" to negative thoughts, depression-prone children, teens, and college students have shown a greatly reduced rate of future depression (Reivich et al., 2013; Seligman et al., 2009). To a large extent, it *is* the thought that counts. For a sampling of commonly used cognitive therapy techniques, see **Table 71.1**.)

TABLE 71.1 Selected Cognitive Therapy Techniques

Aim of Technique	Technique	Therapists' Directives
Reveal beliefs	Question your interpretations	Explore your beliefs, revealing faulty assumptions such as "I need to be liked by everyone."

	Rank thoughts and emotions	Gain perspective by ranking your thoughts and emotions from mildly to extremely upsetting.
Test beliefs	Examine consequences	Explore difficult situations, assessing possible consequences and challenging faulty reasoning.
	Decatastrophize thinking	Work through the actual worst-case consequences of the situation you face (it is often not as bad as imagined). Then determine how to cope with the real situation you face.
Change beliefs	Take appropriate responsibility	Challenge total self-blame and negative thinking, noting aspects for which you may be truly responsible, as well as aspects that aren’t your responsibility.
	Resist extremes	Develop new ways of thinking and feeling to replace maladaptive habits. For example, change from thinking “I am a total failure” to “I got a failing grade on that paper, and I can make these changes to succeed next time.”

PEANUTS


LIFE IS RARELY ALL ONE WAY, CHARLIE BROWN
YOU WIN A FEW, AND YOU LOSE A FEW!
REALLY?
GEE, THAT'D BE NEAT!!
SCHULZ

Drawing by Charles Schultz; ©1956. Reprinted by permission of United Features Syndicate.

It’s not just depressed people who can benefit from positive self-talk. We all talk to ourselves (thinking “I wish I hadn’t said that” can protect us from repeating the blunder). The findings of nearly three dozen sport psychology studies show that self-talk interventions can enhance the learning of athletic skills (Hatzigeorgiadis et al., 2011). For example, novice basketball players may be trained to think “focus” and “follow through,” swimmers to think “high elbow,” and tennis players to think “look at the ball.” People anxious about public speaking have grown in confidence if asked to recall a speaking success, and then to “Explain

WHY you were able to achieve such a successful performance” (Zunick et al., 2015).

Cognitive-Behavioral Therapy

“The trouble with most therapy,” said Ellis, “is that it helps you to feel better. But you don’t get better. You have to back it up with action, action, action.” **Cognitive-behavioral therapy (CBT)** takes a combined approach to depression and other disorders. This widely practiced *integrative* therapy aims to alter not only the way people *think* but also the way they *act*. Like other cognitive therapies, CBT seeks to make people aware of their irrational negative thinking and to replace it with new ways of thinking. And like other behavior therapies, it trains people to *practice* the more positive approach in everyday settings.

cognitive-behavioral therapy (CBT)

a popular integrative therapy that combines cognitive therapy (changing self-defeating thinking) with behavior therapy (changing behavior).

REFRAIN HIDING ...NG OR ...E FOOD
WE FOCUS ON OUR OWN MEAL AND SEEK STAFF SUPPORT AS NEEDED
GENTLE LUNCH (*1-6)
1. RELAX FOCUS YOUR MIND TUNE IN WITH YOUR BODY
3 WE EAT IN SILENCE FOR 15 MINS AT GENTLE LUNCH
WE SURRENDER CONTROL OF OUR FOOD AND FOLLOW THE
2. SLOWLY EAT YOUR MEAL BE AWARE OF ...STE & TEXTURE
4 RATE YOUR HUNGER, 1 is STARVING, 10 is STUFFED
6 CONTINUE EATING WITH AWARENESS AND NO FOOD TALK

Lara Jo Regan

Cognitive therapy for eating disorders aided by journaling Cognitive therapists guide people toward new ways of explaining their good and bad experiences. By recording positive events and how she has enabled them, this woman may become more mindful of her self-control and more optimistic.

Anxiety, depressive disorders, and bipolar disorder share a common problem: emotion regulation (Aldao & Nolen-Hoeksema, 2010; Szkodny et al., 2014). An effective CBT program for these emotional disorders trains people both to replace their catastrophizing thinking with more realistic appraisals, and, as homework, to practice behaviors that are incompatible with their problem (Kazantzis et al., 2010a,b; Moses & Barlow, 2006). A person might keep a log of daily situations associated with negative and positive emotions, and engage more in activities that lead to feeling good. Those who fear social situations might learn to restrain the negative thoughts surrounding their social anxiety and practice approaching people.

CBT effectively treats people with obsessive-compulsive disorder (Öst et al., 2015). In one classic study, people learned to prevent their compulsive behaviors by relabeling their obsessive thoughts (Schwartz et al., 1996). Feeling the urge to wash their hands again, they would tell themselves, “I’m having a compulsive urge.” They would explain to themselves that the hand-washing urge was a result of their brain’s abnormal activity, which they had previously viewed in PET scans. Then, instead of giving in, they would spend 15 minutes in an enjoyable, alternative behavior—practicing an instrument, taking a walk, gardening. This helped “unstick” the brain by shifting attention and engaging other brain areas. For two or three months, the weekly therapy sessions continued, with relabeling and refocusing practice at home. By the study’s end, most participants’ symptoms had diminished and their PET scans revealed normalized brain activity. Many other studies confirm CBT’s effectiveness for treating anxiety, depression, and eating disorders (Cristea et al., 2015; Milrod et al., 2015; Turner et al., 2016). Even online CBT quizzes and exercises—therapy without a face-to-face therapist—have helped alleviate insomnia, depression, and anxiety (Andersson, 2016; Christensen et al., 2016; Kampmann et al., 2016; Vigerland et al., 2016).

A newer CBT variation, *dialectical behavior therapy (DBT)*, helps change harmful and even suicidal behavior patterns (Linehan et al., 2015; Mehlum et al., 2016; Valentine et al., 2015). *Dialectical* means “opposing,” and this therapy attempts to make peace between two opposing forces—acceptance and change. Therapists create an accepting and encouraging environment, helping clients feel they have an ally who will offer them constructive feedback and guidance. In individual sessions, clients learn new ways of thinking that help them tolerate distress and regulate their emotions. They also receive training in social skills and in mindfulness meditation, which helps alleviate depression (Gu et al., 2015; Kuyken et al., 2016). Group training sessions offer additional opportunities to practice new skills in a social context, with further practice as homework.

Group and Family Therapies

71-4 What are the aims and benefits of group and family therapies?

Group Therapy

Except for traditional psychoanalysis, most therapies may also occur in small groups. **Group therapy** does not provide the same degree of therapist involvement with each client. However, it offers other benefits:

group therapy

therapy conducted with groups rather than individuals, providing benefits from group interaction.

- *It saves therapists' time and clients' money,* and often is no less effective than individual therapy (Burlingame et al., 2016).
- *It offers a social laboratory for exploring social behaviors and developing social skills.* Therapists frequently suggest group therapy for people experiencing frequent conflicts or whose behavior distresses others. The therapist guides people's interactions as they discuss issues and try out new behaviors.
- *It enables people to see that others share their problems.* It can be a relief to discover that others, despite their composure, experience some of the same troublesome feelings and behaviors (Ooi et al., 2016).
- *It provides feedback as clients try out new ways of behaving.* Hearing that you look poised, even though you feel anxious and self-conscious, can be very reassuring.

Family Therapy

One special type of group interaction, **family therapy**, assumes that no person is an island: We live and grow in relation to others, especially our families. We struggle to differentiate ourselves from our families, but we also need to connect with them emotionally. These two opposing tendencies can create stress for both the individual and the family.

family therapy

therapy that treats people in the context of their family system. Views an individual’s unwanted behaviors as influenced by, or directed at, other family members.

John Moore/Getty Images

Family therapy This type of therapy often acts as a preventive mental health strategy and may include marriage therapy, as shown here at a retreat for military families. The therapist helps family members understand how their ways of relating to one another create problems. The treatment’s emphasis is not on changing the individuals, but on changing their relationships and interactions.

Family therapists tend to view families as systems, in which each person’s actions trigger reactions from others. A child’s rebellion, for example, affects and is affected by other family tensions. Therapists are often successful in helping family members identify their roles within the family’s social system, improve communication, and discover new ways of preventing or resolving conflicts (Hazelrigg et al., 1987; Shadish et al., 1993).

Self-Help Groups

More than 100 million Americans have belonged to small religious, interest, or support groups that meet regularly—with 9 in 10 reporting that group members “support each other emotionally” (Gallup, 1994). One analysis of online support and self-help groups reported that most focus on stigmatized or hard-to-discuss illnesses (Davison et al., 2000). AIDS patients were 250 times more likely than hypertension patients to be in support groups. People with anorexia and alcohol use disorder often join groups; those with migraines and ulcers usually do not.

FYI

With more than 2 million members worldwide, AA is said to be “the largest organization on Earth that nobody wanted to join” (Finlay, 2000).

The grandparent of support groups, Alcoholics Anonymous (AA), reports having 2.1 million members in 118,000 groups worldwide. Its famous 12-step program, emulated by many other self-help groups, asks members to admit their powerlessness, to seek help from a higher power and from one another, and (the twelfth step) to take the message to others in need of it (Galanter, 2016). Studies of 12-step programs such as AA have found that they help reduce alcohol use disorder at rates comparable to other treatment interventions (Ferri et al., 2006; Moos & Moos, 2005). In an eight-year, $27 million investigation, AA participants reduced their drinking sharply, as did those assigned to CBT or an alternative therapy (Project Match, 1997). Another study of 2300 veterans who sought treatment for alcohol use disorder found that a high level of AA involvement was followed by diminished alcohol problems (McKellar et al., 2003). The more meetings AA members attend, the greater their alcohol abstinence (Moos & Moos, 2006). Those whose personal stories include a “redemptive narrative”—who see something good as having come from their struggles—more often sustain sobriety (Dunlop & Tracy, 2013).

In an individualist age, with more and more people living alone or feeling isolated, the popularity of support groups—for the addicted, the bereaved, the divorced, or simply those seeking fellowship and growth—

may reflect a longing for community and connectedness.

* * *

For a synopsis of these modern psychotherapies, see Table 71.2.

TABLE 71.2 Comparing Modern Psychotherapies

Therapy	**Presumed Problem**	**Therapy Aim**	**Therapy Technique**
Psychodynamic	Unconscious conflicts from childhood experiences	Reduce anxiety through self-insight.	Interpret patients' memories and feelings.
Client-centered	Barriers to self-understanding and self-acceptance	Enable growth via unconditional positive regard, acceptance, genuineness, and empathy.	Listen actively and reflect clients' feelings.
Behavior	Dysfunctional behaviors	Learn adaptive behaviors; extinguish problem ones.	Use classical conditioning (via exposure or aversion therapy) or operant conditioning (as in token economies).
Cognitive	Negative, self-defeating thinking	Promote healthier thinking and self-talk.	Train people to dispute negative thoughts and attributions.
Cognitive-behavioral	Self-harmful thoughts and behaviors	Promote healthier thinking and adaptive behaviors.	Train people to counter self-harmful thoughts and to act out their new ways of thinking.
Group and family	Stressful relationships	Heal relationships.	Develop an understanding of family and other social systems, explore roles, and improve

			communication.

AP® EXAM TIP

Review Table 71.2. You’ll want to be able to compare and contrast the psychotherapies.

✓ Check Your Understanding

Ask Yourself

- What is your judgment of behavior modification techniques, such as those used in token economies? Are you a proponent or a critic of this approach?

Test Yourself

- How do the humanistic and cognitive therapies differ?
- A critical attribute of ____________ ____________, developed by Aaron Beck, focuses on the belief that changing people’s thinking can change their functioning.
- What is cognitive-behavioral therapy, and what sorts of problems does this therapy best address?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 71 REVIEW

71-1 How does the basic assumption of behavior therapy differ from the assumptions of psychodynamic and humanistic therapies? What techniques are used in exposure therapies and aversive conditioning?

- *Behavior therapies* are not insight therapies. Their goal is to apply learning principles to modify problem behaviors.
- Classical conditioning techniques, including *exposure therapies* (such as *systematic desensitization* or *virtual reality exposure therapy*) and *aversive conditioning*, attempt to change behaviors through *counterconditioning*—evoking new responses to old stimuli that trigger unwanted behaviors.

71-2 What is the main premise of therapy based on operant conditioning principles, and what are the views of its proponents and critics?

- Therapy based on operant conditioning principles uses behavior modification techniques to change unwanted behaviors through positively reinforcing desired behaviors and ignoring or punishing undesirable behaviors.
- Critics maintain that (1) techniques such as those used in *token economies* may produce behavior changes that disappear when rewards end, and (2) deciding which behaviors should change is authoritarian and unethical.
- Proponents argue that treatment with positive rewards is more humane than punishing people or institutionalizing them for undesired behaviors.

71-3 What are the goals and techniques of the cognitive therapies

and of cognitive-behavioral therapy?

- The *cognitive therapies*, such as Aaron Beck’s cognitive therapy for depression, assume that our thinking influences our feelings, and that the therapist’s role is to change clients’ self-defeating thinking by training them to perceive and interpret events in more constructive ways.
- *Rational-emotive behavior therapy (REBT)* is a confrontational cognitive therapy that actively challenges irrational beliefs.
- The widely researched and practiced *cognitive-behavioral therapy (CBT)* combines cognitive therapy and behavior therapy by helping clients regularly try out their new ways of thinking and acting in their everyday life.

71-4 What are the aims and benefits of group and family therapy?

- *Group therapy* sessions can help more people and costs less per person than individual therapy would. Clients may benefit from exploring feelings and developing social skills in a group situation, from learning that others have similar problems, and from getting feedback on new ways of behaving.
- *Family therapy* views a family as an interactive system. It attempts to help members discover the roles they play and learn to communicate more openly and directly.

Multiple-Choice Questions

1. Dr. Welle tries to help her clients by teaching them to modify the way they think when under stress or experiencing symptoms. This means that Dr. Welle engages in __________ therapy.

a. behavior
b. cognitive
c. group

d. rational-emotive behavior
e. client-centered

2. Mary Cover Jones helped a little boy named Peter overcome his fear of rabbits by gradually moving a rabbit closer to him each day while he was eating his snack. This was one of the first applications of

a. group therapy.
b. virtual reality exposure therapy.
c. aversive therapy.
d. exposure therapy.
e. cognitive therapy.

3. For every five assignments they complete, Senorita Vale gives her students one “Homework Puntos.” They can use those passes to opt out of future assignments. She is making use of a technique known as

a. family therapy.
b. systematic desensitization.
c. exposure therapy.
d. REBT.
e. a token economy.

4. Jayne has been diagnosed with depression. Her therapist suggested that she get out and interact with her friends more, and that she not allow herself to worry about whether her friends want to be around her. Jayne’s therapist is using what type of approach to treat her depression?

a. Cognitive-behavioral therapy
b. Group therapy
c. Rational-emotive behavior therapy
d. Behavior modification
e. Systematic desensitization

Practice FRQs

1. Alberto has an intense fear of dogs.

- Explain how systematic desensitization could be used as a treatment for this phobia.
- Describe how this therapy would be *counterconditioning* Alberto.

Answer

1 point: With systematic desensitization, a therapist would train Alberto in the use of relaxation techniques while gradually exposing him to the feared stimulus—dogs. Alberto would learn to tolerate situations involving closer and closer proximity to, and finally interaction with, a dog—until he no longer exhibits a fear response to dogs. Page 730

1 point: Therapists using counterconditioning assume that if a phobia has been learned, then it can be unlearned, and that we can’t simultaneously experience anxiety and relaxation. So, if Alberto learns to relax around dogs, then he will no longer experience fear in their presence. The relaxation response will *counter* the fear response. Page 730

2. Explain a possible treatment of obsessive-compulsive disorder from each of the following types of therapy:

- Group therapy
- Cognitive therapy
- Behavioral therapy

(3 points)

Module 72 Evaluating Psychotherapies

LEARNING TARGETS

- 72-1 Analyze whether psychotherapy works and discuss how we can make this judgment.
- 72-2 Discuss which psychotherapies are more effective for specific disorders.
- 72-3 Discuss how alternative therapies fare under scientific scrutiny.
- 72-4 Distinguish the three elements shared by all forms of psychotherapy.
- 72-5 Describe how culture and values influence the therapist-client relationship.
- 72-6 Discuss what a person should look for when selecting a psychotherapist.

Many people presume psychotherapy’s effectiveness. “Seek counseling” or “Ask your mate to find a therapist,” advice columnists often urge. Before 1950, psychiatrists were the primary providers of mental health care. Today’s providers include clinical and counseling psychologists; clinical social workers; pastoral, marital, abuse, and school counselors; and psychiatric nurses. With such an enormous outlay of time as well as money and effort, it is important to ask: Are the millions of people worldwide justified in placing their hopes in psychotherapy?

Is Psychotherapy Effective?

72-1 Does psychotherapy work? How can we know?

The question, though simply put, is not simply answered. If an infection quickly clears, we may assume an antibiotic has been effective. But how can we assess psychotherapy’s effectiveness? By how we feel about our progress? By how our therapist feels about it? By how our friends and family feel about it? By how our behavior has changed?

Clients’ Perceptions

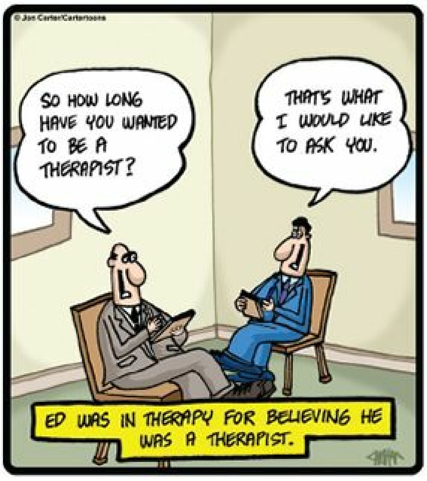
If clients’ testimonials were the only measuring stick, we could strongly affirm psychotherapy’s effectiveness. Consider the 2900 *Consumer Reports* readers who related their experiences with mental health professionals (1995; Kotkin et al., 1996; Seligman, 1995). How many were at least “fairly well satisfied”? Almost 90 percent (as was Kay Redfield Jamison, as we saw at this unit’s beginning). Among those who recalled feeling *fair* or *very poor* when beginning therapy, 9 in 10 now were feeling *very good*, *good*, or at least *so-so*. We have their word for it—and who should know better?

We should not dismiss these testimonials. But critics note reasons for skepticism:

- ***People often enter therapy in crisis.*** When, with the normal ebb and flow of events, the crisis passes, people may attribute their improvement to the therapy. Depressed people often get better no matter what they do.
- ***Clients believe that treatment will be effective.*** The *placebo effect* is the healing power of positive expectations.
- ***Clients generally speak kindly of their therapists.*** Even if the problems remain, clients “work hard to find something positive to say. The therapist had been very understanding, the client had gained a new perspective, he learned to communicate better, his mind was eased, anything at all so as not to have to say treatment was a failure”

(Zilbergeld, 1983, p. 117).

- ***Clients want to believe the therapy was worth the effort.*** To admit investing time and money in something ineffective is like admitting to having one’s car serviced repeatedly by a mechanic who never fixes it.


SO HOW LONG HAVE YOU WANTED TO BE A THERAPIST?
THAT'S WHAT I WOULD LIKE TO ASK YOU.
ED WAS IN THERAPY FOR BELIEVING HE WAS A THERAPIST.

Jon Carter/Cartoonstock

As earlier units document, we are prone to selective and biased recall and to making judgments that confirm our beliefs. Psychologists call this *effort justification*. Consider the testimonials gathered in a massive experiment with over 500 Massachusetts boys, aged 5 to 13 years, many of whom seemed bound for delinquency. By the toss of a coin, half the boys were assigned to a 5-year treatment program. The treated boys were visited by counselors twice a month. They participated in community programs, and they received academic tutoring, medical attention, and family assistance as needed. Some 30 years later, Joan McCord (1978, 1979) located 485 participants, sent them questionnaires, and checked public records from courts, mental hospitals, and other sources. Was the treatment successful?

Client testimonials were glowing. Some men noted that, had it not been for their counselors, “I would probably be in jail,” “My life would have gone the other way,” or “I think I would have ended up in a life of crime.” Court records offered apparent support: Even among the “difficult” boys in the treatment group, 66 percent had no official juvenile crime record.

But recall psychology’s most powerful tool for sorting reality from wishful thinking: the *control group*. For every boy in the treatment group, there was a similar boy in a control group, receiving no counseling. Of these untreated men, *70 percent* had no juvenile record. On several other measures, such as a record of having committed a second crime, alcohol use disorder, death rate, and job satisfaction, the untreated men exhibited slightly *fewer* problems. The glowing testimonials of those treated had been unintentionally deceiving.

Clinicians' Perceptions

If clinicians' perceptions were proof of therapy's effectiveness, we would have even more reason to celebrate. Case studies of successful treatment abound. The problem is that clients justify entering psychotherapy by emphasizing their unhappiness and justify leaving by emphasizing their well-being. Therapists treasure compliments from clients as they say good-bye or later express their gratitude, but they hear little from clients who experience only temporary relief and seek out new therapists for their recurring problems. Thus, therapists are most aware of the failures of other therapists—those whose clients, having experienced only temporary relief, are now seeking a new therapist for their recurring problems. The same person, with the same recurring anxieties, depression, or marital difficulty, may be a "success" story in several therapists' files. Moreover, therapists, like the rest of us, are vulnerable to cognitive errors, such as *confirmation bias* and *illusory correlation* (Lilienfeld et al., 2015).

Outcome Research

How, then, can we objectively measure the effectiveness of psychotherapy? What *outcomes* can we expect—what types of people and problems are helped, and by what type of psychotherapy?

In search of answers, psychologists have turned to the well-traveled path of controlled research. Similar research in the 1800s transformed the field of medicine when skeptical physicians began to realize that many patients were dying despite receiving fashionable treatments (bleeding, purging), and others were getting better on their own. Sorting fact from superstition required observing patients and recording outcomes with and without a particular treatment. Typhoid fever patients, for example, often improved after being bled, convincing most physicians that the treatment worked. Then came the shock. A control group was given mere bed rest, and after five weeks of fever, 70 percent improved, showing that the bleeding was worthless (Thomas, 1992).

In the twentieth century, psychology, with its many different therapy options, faced a similar challenge. British psychologist Hans Eysenck (1952) launched a spirited debate when he summarized 24 studies of psychotherapy outcomes. He found that two-thirds of those receiving psychotherapy for disorders not involving hallucinations or delusions improved markedly. To this day, no one disputes that optimistic estimate.

Why, then, are we still debating psychotherapy’s effectiveness? Because Eysenck also reported similar improvement among *untreated* persons, such as those who were on waiting lists for treatment. With or without psychotherapy, he said, roughly two-thirds improved noticeably. Time was a great healer.

Later research revealed shortcomings in Eysenck’s analyses. His sample was small—only 24 outcome studies in 1952, compared with the hundreds available today. The best of these are *randomized clinical trials*, in which researchers randomly assign people on a waiting list to therapy or to no therapy. Later, they evaluate everyone and compare outcomes, with tests and assessments by others who don’t know whether therapy was given.

Feng Li/Getty Images

Trauma These women were mourning the tragic loss of lives and homes in the 2010 earthquake in China. Those who suffer through such trauma may benefit from counseling, though many people recover on their own or with the help of supportive relationships with family and friends. “Life itself still remains a very effective therapist,” noted psychodynamic therapist Karen Horney (*Our Inner Conflicts*, 1945).

A glimpse of psychotherapy’s overall effectiveness can then be provided by means of a **meta-analysis**, a statistical procedure that combines the conclusions of a large number of different studies. Simply said, meta-analyses give us the bottom-line result of lots of studies. Therapists welcomed the first meta-analysis of some 475 psychotherapy outcome studies (Smith et al., 1980). It showed that the average therapy client ends up better off than 80 percent of the untreated individuals on waiting lists (**Figure 72.1**). The claim is modest—by definition, about 50 percent of untreated people also are better off than the average untreated person. Nevertheless, Mary Lee Smith and her colleagues exulted that “psychotherapy benefits people of all ages as reliably as schooling educates them, medicine cures them, or business turns a profit” (p. 183).

meta-analysis

a procedure for statistically combining the results of many different research studies.

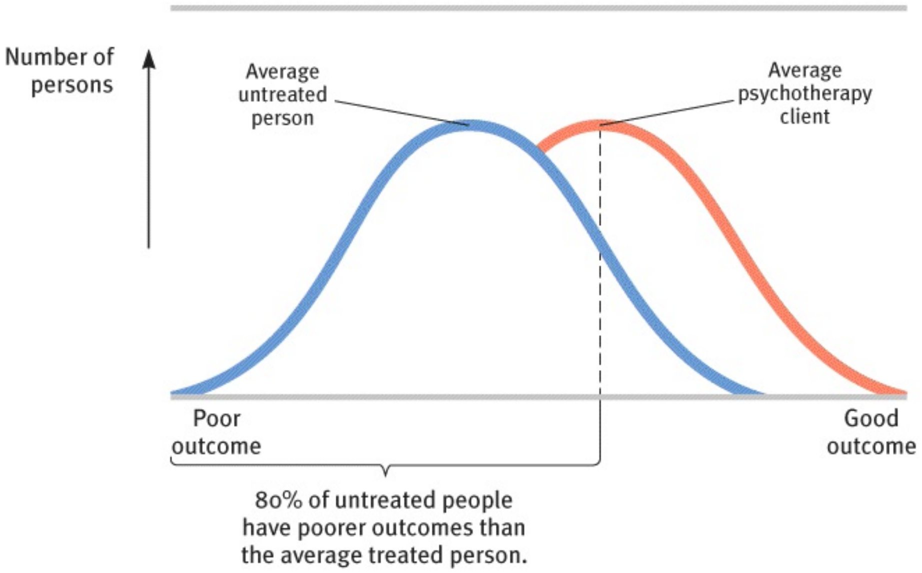


Figure 72.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Smith et al., 1980.

Figure 72.1 Treatment versus no treatment

These two normal distribution curves based on data from 475 studies show the improvement of untreated people and psychotherapy clients. The outcome for the average therapy client surpassed the outcome for 80 percent of the untreated people.

Flip It Video: Outcome Research—Applying Science to Therapy

Dozens of subsequent summaries have now examined psychotherapy's effectiveness. Their verdict echoes earlier results: *Those not undergoing therapy often improve, but those undergoing therapy are more likely to improve—and to improve more quickly and with less risk of relapse* (Kolovos et al., 2017; Weisz et al., 2017). (One qualification: Compared with studies that find no therapy benefit, those that do find a positive therapy effect are more likely to get published [Driessen et al., 2015].) Even so, many people exhibit a more stable and outgoing personality after therapy (Roberts et al., 2017). And some people experience sudden symptom reductions between their treatment sessions for depression or anxiety. Those "sudden gains" bode well for long-term improvement (Aderka et al., 2012).

Psychotherapy also can be cost-effective. Studies show that when people seek psychological treatment, their search for other medical treatment drops—by 16 percent in one digest of 91 studies (Chiles et al., 1999). Given the staggering annual cost of psychological disorders and substance abuse—including crime, accidents, lost work, and treatment—psychotherapy is a good investment, much like money spent on prenatal and well-baby care (Chisholm et al., 2016; Ising et al., 2015). Both *reduce* long-term costs. Boosting employees' psychological well-being can lower medical costs, improve work efficiency, and diminish absenteeism.

But note that the claim—that psychotherapy, *on average,* is somewhat effective—refers to no one therapy in particular. It is like reassuring lung-cancer patients that "on average," medical treatment of health problems is effective. But what distressed people—and those paying for their therapy—want to know is whether a *particular* treatment is effective for their specific problems.

Which Psychotherapies Work Best?

72-2 Are some psychotherapies more effective than others for specific disorders?

The early statistical summaries and surveys did not find that any one type of psychotherapy is generally superior (Smith & Glass, 1977, Smith et al., 1980). Later studies have similarly found little connection between clients' outcomes and their clinicians' experience, training, supervision, and licensing (Barth et al., 2013; Cuijpers, 2017; Kivlighan et al., 2015). A *Consumer Reports* survey confirmed this result. Were clients treated by a psychiatrist, psychologist, or social worker? Were they seen in a group or individual context? Did the therapist have extensive or relatively limited training and experience? It didn't matter. Clients seemed equally satisfied (Seligman, 1995).

> “*Different sores have different salves.*”
>
> *English proverb*

So, was the dodo bird in *Alice in Wonderland* right: “Everyone has won and all must have prizes”? Not quite. One general finding emerges from the studies: The more specific the problem, the greater the hope that psychotherapy might solve it (Singer, 1981; Westen & Morrison, 2001). Those who experience phobias or panic, who are unassertive, or who are frustrated by sexual performance problems can hope for improvement. Those with less-focused problems, such as depression and anxiety, usually benefit in the short term but often relapse later. There often is also an overlapping or *comorbidity* of disorders.

Nevertheless, some forms of therapy do get prizes for effectively treating *particular* problems:

- *Cognitive and cognitive-behavioral therapies*—anxiety, posttraumatic stress disorder, insomnia, and depression (Qaseem et al., 2016; Scaini et al., 2016; Tolin, 2010).

- *Behavioral conditioning therapies*—specific behavior problems, such as bed-wetting, phobias, compulsions, marital problems, and sexual dysfunctions (Baker et al., 2008; Hunsley & DiGiulio, 2002; Shadish & Baldwin, 2005).
- *Psychodynamic therapy*—depression and anxiety (Driessen et al., 2010; Leichsenring & Rabung, 2008; Shedler, 2010b).
- *Nondirective (client-centered) counseling*—mild to moderate depression (Cuijpers et al., 2012).

The evaluation question—which therapies get prizes and which do not?—lies at the heart of what some call psychology's civil war. To what extent should science guide both clinical practice and the willingness of health care providers and insurers to pay for psychotherapy? On one side are research psychologists using scientific methods to extend the list of well-defined and validated therapies for various disorders. They decry clinicians who "give more weight to their personal experience than to science" (Baker et al., 2008). On the other side are nonscientist therapists who view their practice as more art than science: People are too complex and psychotherapy is too intuitive to describe in a manual or test in an experiment. Between these two factions stand the science-oriented clinicians calling for **evidence-based practice**, which has been endorsed by the American Psychological Association and others (2006; Lilienfeld et al., 2013). Therapists using this approach integrate the best available research with clinical expertise and with patient preferences and characteristics (**Figure 72.2**). After rigorous evaluation, clinicians apply therapies suited to their own skills and their patients' unique situations. Increasingly, insurer and government support for mental health services requires evidence-based practice.

evidence-based practice

clinical decision making that integrates the best available research with clinical expertise and patient characteristics and preferences.

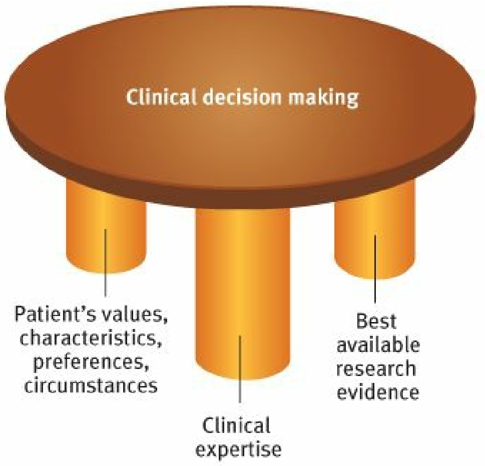

Clinical decision making
Patient's values, characteristics, preferences, circumstances
Clinical expertise
Best available research evidence

Figure 72.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 72.2 Evidence-based clinical decision making

The ideal clinical decision making can be visualized as a three-legged stool, upheld by research evidence, clinical expertise, and knowledge of the patient.

✓ Check Your Understanding

Ask Yourself

- Based on what you've read, would you seek therapy if you were experiencing a problem? If you've already undergone therapy, does what you've learned alter your feelings about the experience?

Test Yourself

- How might the *placebo effect* bias clients' and clinicians' appraisals of the effectiveness of psychotherapies?
- Therapy is most likely to be helpful for those with problems that _______________ (are/are not) well-defined.
- What is *evidence-based practice?*

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Evaluating Alternative Therapies

72-3 How do alternative therapies fare under scientific scrutiny?

The tendency of many abnormal states of mind to return to normal, combined with the placebo effect (the healing power of mere belief in a treatment), creates fertile soil for pseudotherapies. Bolstered by anecdotes, boosted by the media, and broadcast on the Internet, alternative therapies —newer, nontraditional therapies, which often claim healing powers for various ailments—can spread like wildfire. In one national survey, 57 percent of those with a history of anxiety attacks and 54 percent of those with a history of depression had used alternative treatments, such as herbal medicine and spiritual healing (Kessler et al., 2001).

Proponents of alternative therapies often feel that their personal testimonials are evidence enough. But how well do these therapies stand up to scientific scrutiny? There is little evidence for or against most of them. Some, however, have been the subject of controlled research. No prizes—and no scientific support—go to certain alternative therapies (Arkowitz & Lilienfeld, 2006; Lilienfeld et al., 2015). We would all be wise to avoid *energy therapies* that propose to manipulate the client's invisible "energy fields," hand-guided *facilitated communication* with uncommunicative people, *recovered-memory therapies* that aim to unearth "repressed memories" of early child abuse (Module 33), and *rebirthing therapies* that reenact the supposed trauma of a client's birth.

As with medical treatments, some psychological treatments are not only ineffective but also harmful (Barlow, 2010; Castonguay et al., 2010; Dimidjian & Hollon, 2010). The National Science and Technology Council has cited the Scared Straight program (seeking to deter children and youth from crime by having them visit with adult inmates) as an example of one such well-intentioned but ineffective program. The American Psychiatric Association and British Psychological Society have warned against "conversion therapy" for those with same-sex attractions. Conversion therapies, including "reparative therapy," aim to "repair" "something that is not a mental illness and therefore does not require therapy," declared American Psychological Association president Barry Anton (2015). "There is insufficient scientific evidence that they work, and they have the potential to harm the client."

Let's look more closely at two other alternative therapies. As we do, remember that sifting sense from nonsense requires the scientific attitude: being skeptical but not cynical, open to surprises but not gullible.

Eye Movement Desensitization and Reprocessing (EMDR)

EMDR (eye movement desensitization and reprocessing) is a therapy adored by thousands and dismissed by thousands more as a sham. Psychologist Francine Shapiro (1989, 2007, 2012) developed EMDR while walking in a park and observing that anxious thoughts vanished as her eyes spontaneously darted about. Back in the clinic, she had people imagine traumatic scenes while she triggered eye movements by waving her finger in front of their eyes, supposedly enabling them to unlock and reprocess previously frozen memories. Thousands of mental health professionals from more than 75 countries have since undergone training (EMDR, 2011).

Does EMDR work? Shapiro (1999, 2002) believes it does, and she cites four studies in which it worked for 84 to 100 percent of single-trauma victims. Other studies have confirmed its benefits with trauma survivors (Chen et al., 2015). But why, wonder skeptics, would rapidly moving one's eyes while recalling traumas be therapeutic? Some argue that eye movements relax or distract patients, thus allowing memory-associated emotions to extinguish (Gunter & Bodner, 2008). (Part of therapeutic change is calling up old memories and associating them with new emotions [Lane et al., 2015].) Others believe the eye movements themselves are *not* the therapeutic ingredient (nor is watching high-speed Ping-Pong therapeutic). Trials in which people imagined traumatic scenes and tapped a finger, or just stared straight ahead while the therapist's finger wagged, have also produced therapeutic results (Devilly, 2003).

> “*Studies indicate that EMDR is just as effective with fixed eyes. If that conclusion is right, what’s useful in the therapy (chiefly behavioral desensitization) is not new, and what’s new is superfluous.*”
>
> *Harvard Mental Health Letter, 2002*

Skeptics acknowledge that EMDR does work better than doing nothing (Lilienfeld & Arkowitz, 2007). But they suspect that what is therapeutic is the combination of exposure therapy—repeatedly calling up traumatic memories and reconsolidating them in a safe and reassuring context—and perhaps some placebo effect.

Light Exposure Therapy

Have you ever found yourself oversleeping, gaining weight, and feeling lethargic, perhaps during the dark mornings and overcast days of winter? Slowing down and conserving energy during the cold, barren winters may have given our distant ancestors a survival advantage. To counteract lethargy, National Institute of Mental Health researchers in the early 1980s had an idea: Give people a timed daily dose of intense light. Sure enough, people reported they felt better.

SEASONAL FUND-RAISING
FOR THE YOUNG ENTREPRENEUR
GOT WINTER BLUES?
LIGHT Therapy 5¢
K. LeMieux

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Was light exposure a bright idea, or another dim-witted example of the placebo effect? Research illuminates the issue. One study exposed some people with a seasonal pattern in their depression symptoms to 90 minutes of bright light and others to a sham placebo treatment—a hissing “negative ion generator" about which the staff expressed similar enthusiasm (but which was actually just producing white noise). After four weeks, 61 percent of those exposed to morning light had greatly improved, as had 50 percent of those exposed to evening light and 32 percent of those exposed to the placebo (Eastman et al., 1998).

Some studies have cast a shadow on light exposure therapy. Nevertheless, others have shown that 30 minutes of morning exposure to 10,000-lux white fluorescent light produces relief for most depressed people. Moreover, it does so as effectively as taking antidepressant drugs or undergoing cognitive-behavioral therapy (Lam et al., 2006, 2016; Rohan et al., 2007, 2015). Brain scans help explain the benefit: Light therapy sparks activity in a brain region that influences the body's arousal and hormone levels (Ishida et al., 2005).

Christine Brune

Light therapy To counteract depression, some people spend time each morning exposed to intense light that mimics natural outdoor light. Light boxes are available from health supply and lighting stores.

How Do Psychotherapies Help People?

72-4 What three elements are shared by all forms of psychotherapy?

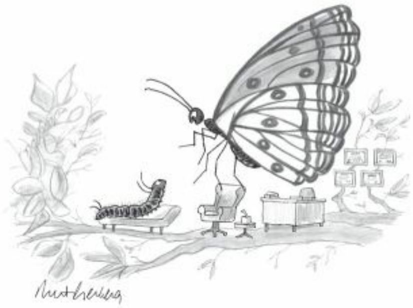
Why have studies found little correlation between therapists’ training and experience and clients’ outcomes? The answer seems to be that all psychotherapies share three basic benefits (Frank, 1982; Wampold, 2007):

- ***Hope for demoralized people*** People seeking therapy typically feel anxious, depressed, self-disapproving, and incapable of turning things around. What any psychotherapy offers is the expectation that, with commitment from the therapy seeker, things can and will get better. This belief, apart from any therapeutic technique, may improve morale, create feelings of self-efficacy, and diminish symptoms (Corrigan, 2014; Meyerhoff & Rohan, 2016).
- ***A new perspective*** Every therapy offers people a plausible explanation of their symptoms. Armed with a believable fresh perspective, they may approach life with a new attitude, open to making changes in their behaviors and their views of themselves.
- ***An empathic, trusting, caring relationship*** To say that therapy outcome is unrelated to training and experience is not to say all *therapists* are equally effective. No matter what technique they use, effective therapists are empathic. They seek to understand the client’s experience. They communicate care and concern, and they earn trust through respectful listening, reassurance, and guidance. These qualities were clear in recorded therapy sessions from 36 recognized master therapists (Goldfried et al., 1998). Some took a cognitive-behavioral approach. Others used psychodynamic principles. Regardless, the striking finding was how *similar* they were. At key moments, the empathic therapists of both persuasions would help clients evaluate themselves, link one aspect of their life with another, and gain insight into their interactions with others. The emotional bond between therapist and client—the

therapeutic alliance—helps explain why empathic, caring therapists are especially effective (Klein et al., 2003; Wampold, 2001).

David Buffington/Getty Images

A caring relationship Effective therapists form a bond of trust with their clients.



Mort Gerberg The New Yorker Collection /The Cartoon Bank

“The thing is, you have to really want to change.”

therapeutic alliance

a bond of trust and mutual understanding between a therapist and client, who work together constructively to overcome the client’s problem.

These three common elements—hope, a fresh perspective, and an empathic, caring relationship—help us understand why *paraprofessionals* (briefly trained caregivers, who may be recovered former clients) can assist many troubled people so effectively (Bryan & Arkowitz, 2015; Christensen & Jacobson, 1994). They are also part of what the growing numbers of self-help and support groups offer their members. And they are part of what traditional healers have offered (Jackson, 1992). Healers everywhere—special people to whom others disclose their suffering, whether psychiatrists, witch doctors, or shamans—have listened in order to understand and to empathize, reassure, advise, console, interpret, or explain (Torrey, 1986). Such qualities may explain why people who feel supported by close relationships—who enjoy the fellowship and friendship of caring people—have been less likely to need or seek therapy (Frank, 1982; O'Connor & Brown, 1984).

* * *

To recap, people who seek help usually improve. So do many of those who do not undergo psychotherapy, and that is a tribute to our human resourcefulness and our capacity to care for one another. Nevertheless, though the therapist's orientation and experience appear not to matter much, people who receive some psychotherapy usually improve more than those who do not. People with clear-cut, specific problems tend to improve the most.

Culture and Values in Psychotherapy

72-5 How do culture and values influence the therapist-client relationship?

All psychotherapies offer hope, and nearly all psychotherapists attempt to enhance their clients' sensitivity, openness, personal responsibility, and sense of purpose (Jensen & Bergin, 1988). But in matters of culture and values, psychotherapists differ from one another and may differ from their clients (Delaney et al., 2007; Kelly, 1990).

These differences can create a mismatch when a therapist from one culture interacts with a client from another. In North America, Europe, and Australia, for example, most psychotherapists reflect their culture's *individualism*, which often gives priority to personal desires and identity. Clients with a *collectivist* perspective, as with many from Asian cultures, may assume people will be more mindful of social and family responsibilities, harmony, and group goals. These clients may have trouble relating to therapies that require them to think only of their own well-being (Markus & Kitayama, 1991).

Cultural differences help explain some groups' reluctance to use mental health services. People living in "cultures of honor" prize being strong and tough. They may feel that seeking mental health care is an admission of weakness rather than an opportunity for growth (Brown et al., 2014). And some minority groups tend to be both reluctant to seek therapy and quick to leave it (Chen et al., 2009; Sue et al., 2009). In one experiment, Asian-American clients matched with counselors who shared their cultural values (rather than mismatched with those who did not) perceived more counselor empathy and felt a stronger alliance with the counselor (Kim et al., 2005).

Client-psychotherapist mismatches may also stem from religious values. Highly religious people may prefer and benefit from religiously similar therapists, and may have trouble forming an emotional bond with one who does not share their values (Masters, 2010; Pearce et al., 2015).

Finding a Mental Health Professional

72-6 What should a person look for when selecting a psychotherapist?

Life for everyone is marked by a mix of serenity and stress, blessing and bereavement, good moods and bad. So, when should we seek a mental health professional’s help? The American Psychological Association offers these common trouble signals:

- Feelings of hopelessness
- Deep and lasting depression
- Self-destructive behavior, such as substance abuse
- Disruptive fears
- Sudden mood shifts
- Thoughts of suicide
- Compulsive rituals, such as hand washing
- Hearing voices or seeing things that others don’t experience

In looking for a psychotherapist, you may want to have a preliminary consultation with two or three. High school counseling offices are generally good starting points and may offer some free services. You can describe problems you’re experiencing and learn about each therapist’s treatment approach. You can also ask questions about the therapist’s values, credentials (**Table 72.1**), and fees. And you can assess your own feelings about each of them. The emotional bond between therapist and client is perhaps the most important factor in effective therapy.

TABLE 72.1 Therapists and Their Training

Type	**Therapy Description**
Clinical psychologists	Most are psychologists with a Ph.D. (includes research training) or Psy.D. (focuses on therapy) supplemented by a supervised internship and, often, post-doctoral training. About half work in

	agencies and institutions, half in private practice.
Psychiatrists	Psychiatrists are physicians who specialize in the treatment of psychological disorders. Not all psychiatrists have had extensive training in psychotherapy, but as M.D.s or D.O.s they can prescribe medications. Thus, they tend to see those with the most serious problems. Many have their own private practice.
Clinical or psychiatric social workers	A two-year master of social work graduate program plus postgraduate supervision prepares some social workers to offer psychotherapy, mostly to people with everyday personal and family problems. About half have earned the National Association of Social Workers' designation of clinical social worker.
Counselors	Marriage and family counselors specialize in problems arising from family relations. Clergy provide counseling to countless people. Abuse counselors work with substance abusers and with spouse and child abusers and their victims. Mental health and other counselors may be required to have a two-year master's degree.

The American Psychological Association recognizes the importance of a strong therapeutic alliance, and it welcomes diverse therapists who can relate well to diverse clients. It accredits programs that provide training in cultural sensitivity (for example, to differing values, communication styles, and language) and that recruit underrepresented cultural groups.

Check Your Understanding

Ask Yourself

- How might your culture and values influence the sort of therapy you would welcome—or your willingness to seek therapy at all?

Test Yourself

- Those who undergo psychotherapy are _______________ (more/less) likely to show improvement than those who do not undergo psychotherapy.
- What does the evidence suggest about the efficacy of EMDR and light therapy?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 72 REVIEW

72-1 Does psychotherapy work? How can we know?

- Clients’ and therapists’ positive testimonials cannot prove that therapy is actually effective, and the placebo effect makes it difficult to judge whether improvement occurred because of the treatment.
- Using *meta-analyses* to statistically combine the results of hundreds of randomized psychotherapy outcome studies, researchers have found that those not undergoing treatment often improve, but those undergoing psychotherapy are more likely to improve more quickly and with less chance of relapse.

72-2 Are some psychotherapies more effective than others for specific disorders?

- No one type of psychotherapy is generally superior to all others. Therapy is most effective for those with clear-cut, specific problems.
- Some therapies—such as behavior conditioning for treating phobias and compulsions—are more effective for specific disorders.
- Psychodynamic therapy has helped treat depression and anxiety, and cognitive and cognitive-behavioral therapies have been effective in helping people cope with anxiety, posttraumatic stress disorder, insomnia, and depression.
- *Evidence-based practice* integrates the best available research with clinicians’ expertise and patients’ characteristics, preferences, and circumstances.

72-3 How do alternative therapies fare under scientific scrutiny?

- Controlled research has found some benefits of eye movement desensitization and reprocessing (EMDR) therapy for PTSD, though possibly for reasons unrelated to eye movements.

- Light exposure therapy does seem to help those with a seasonal pattern in their depression symptoms by activating a brain region that influences arousal and hormones.

72-4 What three elements are shared by all forms of psychotherapy?

- All psychotherapies offer new hope for demoralized people; a fresh perspective; and (if the therapist is effective) an empathic, trusting, and caring relationship.
- The emotional bond of trust and understanding between therapist and client—the *therapeutic alliance*—is an important element in effective therapy.

72-5 How do culture and values influence the therapist-client relationship?

- Therapists differ in the values that influence their goals in therapy and their views of progress. These differences may create problems if therapists and clients differ in their cultural, gender, or religious perspectives.

72-6 What should a person look for when selecting a psychotherapist?

- A person seeking therapy may want to ask about the therapist's treatment approach, values, credentials, and fees.
- An important consideration is whether the therapy seeker feels comfortable and able to establish a bond with the therapist.

Multiple-Choice Questions

1. Trevor spends 45 minutes a day in front of an intense light. It is most likely that he is being treated with

a. cognitive therapy.
b. light therapy.
c. EMDR therapy.
d. rational-emotive behavior therapy.
e. psychodynamic therapy.

2. Meta-analysis is

a. a drug study based on a small sample.
b. a treatment versus no treatment group.
c. a tendency for smaller scores to move toward the average.
d. regressing from unusual to usual.
e. a way to combine the results of many studies.

3. Which of the following is the best phrase for a bond of trust and mutual understanding between a therapist and client who are working to overcome the client's problem?

a. Therapeutic alliance
b. EMDR
c. Evidence-based practice
d. Meta-analysis
e. Outcome research

4. Knowing that you have taken AP® psychology, a friend of yours asks for your opinion on which type of psychotherapy she should consider for her anxiety. What would be your advice?

a. Psychodynamic therapy is best for anxiety.
b. Rational-emotive behavior therapy has had the best results in treating anxiety.
c. She should avoid client-centered therapy as it has been shown to have very little value.
d. Cognitive, cognitive-behavioral, and psychodynamic therapies have all demonstrated effectiveness for treating anxiety.
e. It does not matter what type of psychotherapy she chooses, because

anxiety can only be treated with medication.

Practice FRQs

1. Guillermo's physician suggested that he see a therapist for possible depression. Explain how effective each of the following might be in the treatment of his depression:

- Psychiatrist
- Clinical psychologist
- Counselor

Answer

1 point: As a medical doctor, a psychiatrist would be able to prescribe medication to Guillermo. The psychiatrist, however, may not be trained in psychotherapy, so may not fully be able to help Guillermo. ↪ Page 748

1 point: A clinical psychologist would have psychotherapy training and be able to provide effective methods, such as cognitive-behavioral therapy, to Guillermo. ↪ Page 748

1 point: A counselor would be the least helpful therapist for Guillermo. This type of therapist tends to help with family, marriage, or substance abuse issues, not depression. ↪ Page 748

2. Identify three commonly agreed-upon benefits shared by all psychotherapies.

(3 points)

Module **73 The Biomedical Therapies and Preventing Psychological Disorders**

LEARNING TARGETS

- 73-1 Examine how therapeutic lifestyle change could be considered an effective biomedical therapy, and explain how it works.
- 73-2 Describe the drug therapies, and discuss how double-blind studies help researchers evaluate a drug’s effectiveness.
- 73-3 Discuss how brain stimulation and psychosurgery are used to treat specific disorders.
- 73-4 Describe the rationale for preventive mental health programs, and evaluate the importance of developing resilience.

The Biomedical Therapies

Psychotherapy is one way to treat psychological disorders. The other is *biomedical therapy*. Biomedical treatments can change the brain's chemistry with drugs; affect its circuitry with electrical stimulation, magnetic impulses, or psychosurgery; or influence its responses with lifestyle changes.

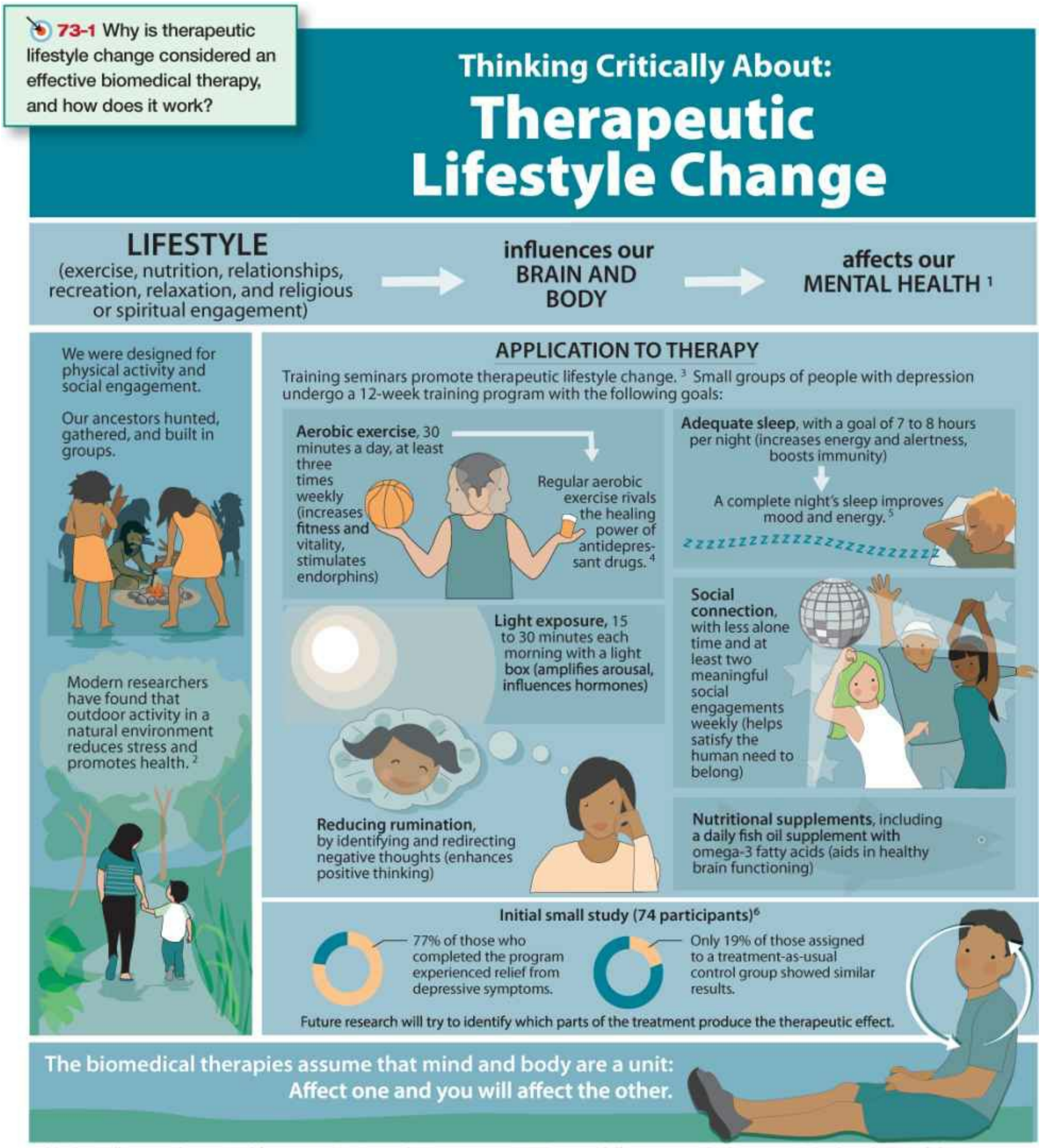
Are you surprised to find *lifestyle changes* in this list? We find it convenient to talk of separate psychological and biological influences, but everything psychological is also biological. Thus, our lifestyle—our exercise, nutrition, relationships, recreation, relaxation, and religious or spiritual engagement—affects our mental health (Schuch et al., 2016; Walsh, 2011). (See Thinking Critically About: Therapeutic Lifestyle Change.)

Every thought and feeling depends on the functioning brain. Every creative idea, every moment of joy or anger, every period of depression emerges from the electrochemical activity of the living brain. Anxiety disorders, obsessive-compulsive disorder, posttraumatic stress disorder, major depressive disorder, bipolar disorder, and schizophrenia are all biological events. Some psychologists consider even psychotherapy to be a biological treatment, because changing the way we think and behave is a brain-changing experience (Kandel, 2013). When psychotherapy relieves behaviors associated with obsessive-compulsive disorder or schizophrenia, PET scans reveal a calmer brain (Habel et al., 2010; Schwartz al., 1996). As we have seen over and over again, *a human being is an integrated biopsychosocial system.*

> “*No twisted thought without a twisted molecule.*”
>
> *Attributed to psychologist Ralph Gerard*

sturti/Getty Images

Healthier lifestyles Researchers suggest that therapeutic lifestyle change can be an effective antidote for people with depression. The changes include managing sleep time, spending more time outdoors (or with a light box), getting more exercise, and developing more social connections.



73-1 Why is therapeutic lifestyle change considered an effective biomedical therapy, and how does it work?

Thinking Critically About:

Therapeutic Lifestyle Change

LIFESTYLE (exercise, nutrition, relationships, recreation, relaxation, and religious or spiritual engagement) → **influences our BRAIN AND BODY** → **affects our MENTAL HEALTH**[1]

We were designed for physical activity and social engagement.

Our ancestors hunted, gathered, and built in groups.

Modern researchers have found that outdoor activity in a natural environment reduces stress and promotes health.[2]

APPLICATION TO THERAPY

Training seminars promote therapeutic lifestyle change.[3] Small groups of people with depression undergo a 12-week training program with the following goals:

Aerobic exercise, 30 minutes a day, at least three times weekly (increases fitness and vitality, stimulates endorphins)

Regular aerobic exercise rivals the healing power of antidepressant drugs.[4]

Adequate sleep, with a goal of 7 to 8 hours per night (increases energy and alertness, boosts immunity)

A complete night's sleep improves mood and energy.[5]

Light exposure, 15 to 30 minutes each morning with a light box (amplifies arousal, influences hormones)

Social connection, with less alone time and at least two meaningful social engagements weekly (helps satisfy the human need to belong)

Reducing rumination, by identifying and redirecting negative thoughts (enhances positive thinking)

Nutritional supplements, including a daily fish oil supplement with omega-3 fatty acids (aids in healthy brain functioning)

Initial small study (74 participants)[6]

77% of those who completed the program experienced relief from depressive symptoms.

Only 19% of those assigned to a treatment-as-usual control group showed similar results.

Future research will try to identify which parts of the treatment produce the therapeutic effect.

The biomedical therapies assume that mind and body are a unit: Affect one and you will affect the other.

1. Sánchez-Villegas et al., 2015; Walsh, 2011. 2. MacKerron & Mourato, 2013; NEEF, 2015; Phillips, 2011. 3. Ilardi, 2009. 4. Babyak et al., 2000; Salmon, 2001; Schuch et al., 2016b. 5. Gregory et al., 2009; Walker & van der Helm, 2009. 6. Ilardi, 2009, 2016.

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Check Your Understanding

Ask Yourself

- In what ways do you think *your* lifestyle is affecting your mental health?

Test Yourself

- What are some examples of lifestyle changes we can make to enhance our mental health?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Drug Therapies

Flip It Video: How Drug Therapy Works

73-2 What are the drug therapies? How do double-blind studies help researchers evaluate a drug's effectiveness?

By far the most widely used biomedical treatments today are the drug therapies. Most drugs for anxiety and depression are prescribed by primary care providers, followed by psychiatrists and, in some states, psychologists.

Since the 1950s, discoveries in **psychopharmacology** (the study of drug effects on mind and behavior) have revolutionized the treatment of people with severe disorders, liberating hundreds of thousands from hospital confinement. Thanks to drug therapy and local community mental health programs, the resident population of U.S. state and county mental hospitals is now a small fraction of what it was in the mid-twentieth century. For some who are unable to care for themselves, however, release from hospitals has meant homelessness, not liberation.

psychopharmacology

the study of the effects of drugs on mind and behavior.

Almost any new treatment, including drug therapy, is greeted by an initial wave of enthusiasm as many people apparently improve. But that enthusiasm often diminishes on closer examination. To evaluate the effectiveness of any new drug, researchers also need to know normal recovery rates:

- How many people recover without treatment, and how quickly?
- Is recovery due to the drug or to the *placebo effect?* When patients or mental health workers expect positive results, they may see what they expect, not what really happens. Even mere exposure to advertising about a drug's supposed effectiveness can increase its effect (Kamenica

et al., 2013).

Edward Koren The New Yorker Collection/The Cartoon Bank

"Our psychopharmacologist is a genius."

To control for these influences, drug researchers give half the patients the drug, and the other half a similar-appearing placebo. Because neither the staff nor the patients know who gets which, this is called a *double-blind procedure*. The good news: In double-blind studies, several types of drugs effectively treat psychological disorders.

Antipsychotic Drugs

An accidental discovery launched a treatment revolution for people with *psychoses*. The discovery: Certain drugs, used for other medical purposes, calmed the hallucinations or delusions that are part of these patients' split from reality. First-generation **antipsychotic drugs**, such as chlorpromazine (Thorazine), dampened responsiveness to irrelevant stimuli. Thus, they provided the most help to patients experiencing positive (actively inappropriate) symptoms of schizophrenia, such as auditory hallucinations and paranoia (Lehman et al., 1998; Lenzenweger et al., 1989). (Antipsychotic drugs are not equally effective in changing negative symptoms such as apathy and withdrawal.)

antipsychotic drugs

drugs used to treat schizophrenia and other forms of severe thought disorder.

The molecules of most conventional antipsychotic drugs are similar enough to molecules of the neurotransmitter dopamine to occupy its receptor sites and block its activity. This finding reinforces the idea that an overactive dopamine system contributes to schizophrenia.

FYI

Perhaps you can guess an occasional side effect of L-dopa, a drug that raises dopamine levels for Parkinson’s patients: hallucinations.

Antipsychotics also have powerful side effects. Some produce sluggishness, tremors, and twitches similar to those of Parkinson’s disease (Kaplan & Saddock, 1989). Long-term use of antipsychotics can produce *tardive dyskinesia*, with involuntary movements of the facial muscles (such as grimacing), tongue, and limbs. Although not more effective in controlling schizophrenia symptoms, many of the newer-generation antipsychotics, such as risperidone (Risperdal) and olanzapine (Zyprexa), work best for those with severe symptoms and have fewer of these effects (Furukawa et al., 2015). These drugs may, however, increase the risk of obesity and diabetes (Buchanan et al., 2010; Tiihonen et al., 2009).

AP® EXAM TIP

The discussion of drug therapies is a great opportunity for you to review information about neurotransmitters and brain function. See Unit III (Biological Bases of Behavior) if you need to brush up on these topics.

Antipsychotics, combined with life-skills programs and family support, have given new hope to many people with schizophrenia (Guo et al., 2010). Hundreds of thousands of patients have left the wards of mental hospitals and returned to work and to near-normal lives (Leucht et al., 2003). Elyn Saks (2007), a University of Southern California law professor, knows what it means to live with schizophrenia. Thanks to her treatment, which combines an antipsychotic drug and psychotherapy, she noted, “Now I’m mostly well. I’m mostly thinking clearly. I do have episodes, but it’s not like I’m struggling all of the time to stay on the right side of the line.”

Antianxiety Drugs

Like alcohol, **antianxiety drugs**, such as Xanax or Ativan, depress central nervous system activity (and so should not be used in combination with alcohol). Some antianxiety drugs have been successfully used in combination with psychological therapy to enhance exposure therapy’s extinction of learned fears and to help relieve the symptoms of posttraumatic stress disorder and obsessive-compulsive disorder (Davis, 2005; Kushner et al., 2007).

antianxiety drugs

drugs used to control anxiety and agitation.

Some critics fear that antianxiety drugs may reduce symptoms without resolving underlying problems, especially when used as an ongoing treatment. “Popping a Xanax” at the first sign of tension can create a learned response: The immediate relief reinforces a person’s tendency to take drugs when anxious. Antianxiety drugs can also be addictive. Regular users who stop taking these drugs may experience increased anxiety, insomnia, and other withdrawal symptoms.

Antidepressant Drugs

The **antidepressant drugs** were named for their ability to lift people up from a state of depression, and this was their main use until recently. The label is a bit of a misnomer now that these drugs are increasingly used to treat anxiety disorders, obsessive-compulsive disorder, and posttraumatic stress disorder (Wetherell et al., 2013). Many work by increasing the availability of neurotransmitters, such as norepinephrine or serotonin, which elevate arousal and mood and are scarce when a person experiences feelings of depression or anxiety. The most commonly prescribed drugs in this group, including Prozac and its cousins Zoloft and Paxil, work by prolonging the time serotonin molecules remain in the brain’s synapses. They do this by partially blocking the normal reuptake process (**Figure 73.1**). Given their use in treating disorders other than depression—from anxiety to strokes—these drugs are most often called *SSRIs—selective serotonin reuptake inhibitors* (rather than antidepressants) (Kramer, 2011).

antidepressant drugs

drugs used to treat depression, anxiety disorders, obsessive-compulsive disorder, and posttraumatic stress disorder. (Several widely used antidepressant drugs are *selective serotonin reuptake inhibitors—SSRIs.*)

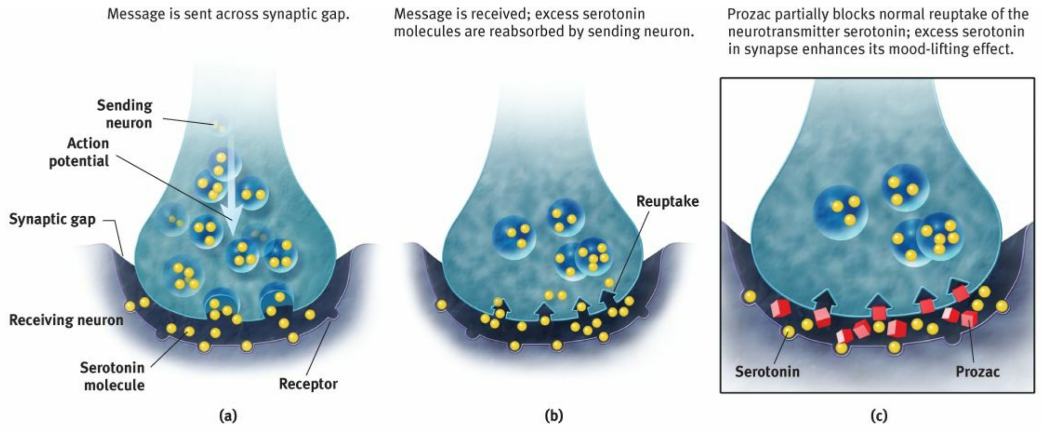
Message is sent across synaptic gap.
Message is received; excess serotonin molecules are reabsorbed by sending neuron.
Prozac partially blocks normal reuptake of the neurotransmitter serotonin; excess serotonin in synapse enhances its mood-lifting effect.
Sending neuron
Action potential
Synaptic gap
Receiving neuron
Serotonin molecule
Receptor
Reuptake
Serotonin
Prozac
(a)
(b)
(c)

Figure 73.1
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Figure 73.1 Biology of antidepressants

Shown here is the action of Prozac, which partially blocks the reuptake of serotonin.

Some of the older antidepressant drugs work by blocking the reabsorption or breakdown of both norepinephrine and serotonin. Though effective, these dual-action drugs have more potential side effects, such as dry mouth, weight gain, hypertension, or dizzy spells (Anderson, 2000; Mulrow, 1999). Administering them by means of a patch, which bypasses the intestines and liver, helps reduce such side effects (Bodkin & Amsterdam, 2002). Some professionals prefer the SSRIs over other antidepressants (Jakubovski et al., 2015; Kramer, 2011).

Peter C. Vey/The New Yorker Collection.cartooonbank.com

"If this doesn't help you don't worry, it's a placebo."

But be advised: Patients with depression who begin taking these medications do not wake up the next day singing, "It's a beautiful day!" SSRIs begin to influence neurotransmission within hours, but their full psychological effect may take four weeks (and may involve a side effect of diminished sexual desire). One possible reason for the delay is that increased serotonin promotes new synapses plus *neurogenesis*—the birth of new brain cells—perhaps reversing stress-induced loss of neurons (Launay et al., 2011). Researchers are also exploring the possibility of quicker-acting antidepressants. One, ketamine, which is also an anesthetic and a party drug, blocks hyperactive receptors for glutamate, a neurotransmitter, and causes a burst of new synapses. It can provide relief from depression within hours of an infusion, often after transient hallucinations (Grimm & Scheidegger, 2013; McGirr et al., 2015; Naughton et al., 2014). But the relief often dissipates in a week (Kishimoto et al., 2016). Some drug companies are hoping to develop a ketamine-like, fast-acting drug without its side effects (Kirby, 2015).

Antidepressant drugs are not the only way to give the body a lift. Aerobic exercise can calm people who feel anxious, energize those who feel depressed, and offer other positive side effects (more on that topic later in this module). Cognitive therapy, by helping people reverse their habitual negative thinking style, can boost drug-aided relief from depression and reduce posttreatment relapses (Amick et al., 2015). Some clinicians attack depression (and anxiety) from both below and above

(Cuijpers et al., 2010; Hollon et al., 2014; Kennard et al., 2014): They use antidepressant drugs (which work, bottom-up, on the emotion-forming limbic system) in conjunction with cognitive-behavioral therapy (which works, top-down, to alter frontal lobe activity and change thought processes).

Researchers generally agree that people with depression often improve after a month on antidepressant drugs. But after allowing for natural recovery and the placebo effect, how big is the drug effect? Not big, report some researchers (Kirsch et al., 1998, 2014, 2016). In double-blind clinical trials, placebos produced improvement comparable to about 75 percent of the active drug's effect. For those with severe depression, the placebo effect is less and the added drug benefit somewhat greater (Fournier et al., 2010; Kirsch et al., 2008; Olfson & Marcus, 2009). Given that antidepressants often have unwanted side effects, and that aerobic exercise and cognitive behavioral therapy are also effective antidotes to mild or moderate depression, Irving Kirsch (2016) recommends more limited antidepressant use: "If they are to be used at all, it should be as a last resort."

Mood-Stabilizing Medications

In addition to antipsychotic, antianxiety, and antidepressant drugs, psychiatrists have *mood-stabilizing drugs* in their arsenal. One of them, Depakote, was originally used to treat epilepsy. It was also found effective in controlling the manic episodes associated with bipolar disorder. Another, the simple salt *lithium*, effectively levels the emotional highs and lows of this disorder.

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“First of all I think you should know that last quarter’s sales figures are interfering with my mood-stabilizing drugs.”

Australian physician John Cade discovered the benefits of lithium in the 1940s when he administered it to a patient with severe mania and the patient became well in less than a week (Snyder, 1986). About 7 in 10 people with bipolar disorder benefit from a long-term daily dose of this cheap salt, which helps prevent or ease manic episodes and, to a lesser extent, lifts depression (Solomon et al., 1995). Kay Redfield Jamison (1995, pp. 88–89) described the effect:

> Lithium prevents my seductive but disastrous highs, diminishes my depressions, clears out the wool and webbing from my disordered thinking, slows me down, gentles me out, keeps me from ruining my career and relationships, keeps me out of a hospital, alive, and makes psychotherapy possible.

Taking lithium also correlates with a lower risk of suicide among people with bipolar disorder—to about one-sixth the risk of those not taking lithium (Oquendo et al., 2011). Naturally occurring lithium in drinking water has also correlated with lower suicide rates (across 18 Japanese cities and towns) and lower crime rates (across 27 Texas counties) (Ohgami et al., 2009; Schrauzer & Shrestha, 1990, 2010; Terao et al., 2010). Lithium works.

Brain Stimulation

73-3 How are brain stimulation and psychosurgery used in treating specific disorders?

Electroconvulsive Therapy

Another biomedical treatment, **electroconvulsive therapy (ECT)**, manipulates the brain by shocking it. When ECT was first introduced in 1938, the wide-awake patient was strapped to a table and jolted with electricity to the brain. The procedure, which produced convulsions and brief unconsciousness, gained a barbaric image. Although that image lingers, today’s ECT is much kinder and gentler, and no longer “convulsive.” The patient receives a general anesthetic and a muscle relaxant (to prevent bodily convulsions). A psychiatrist then delivers a brief pulse of electrical current, sometimes only to the brain’s right side, which triggers a 30- to 60-second seizure (McCall et al., 2017). Within 30 minutes, the patient awakens and remembers nothing of the treatment or of the preceding hours.

electroconvulsive therapy (ECT)

a biomedical therapy for severely depressed patients in which a brief electric current is sent through the brain of an anesthetized patient.

Study after study confirms that ECT can effectively treat severe depression in “treatment-resistant” patients who have not responded to drug therapy (Bailine et al., 2010; Fink, 2009; Lima et al., 2013; Medda et al., 2015). After three such sessions each week for two to four weeks, 70 percent or more of those receiving today’s ECT improve markedly, without discernible brain damage and with less memory loss than with earlier versions of ECT (HMHL, 2007). ECT also reduces suicidal thoughts and has been credited with saving many from suicide (Kellner et al., 2006). A *Journal of the American Medical Association* editorial concluded that “the results of ECT in treating severe depression are among the most positive treatment effects in all of medicine” (Glass, 2001).

FYI

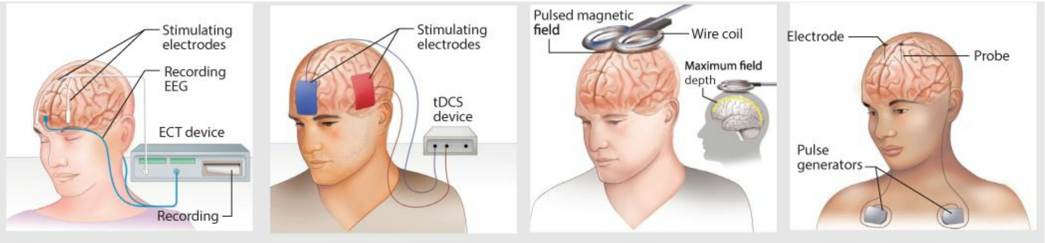
The medical use of electricity is an ancient practice. Physicians treated the Roman Emperor Claudius (10 B.C.E.–54 C.E.) for headaches by pressing electric eels to his temples.

How does ECT alleviate severe depression? After more than 70 years, no one knows for sure. One recipient likened ECT to the smallpox vaccine, which was saving lives before we knew how it worked. Perhaps the brief electric current calms neural centers where overactivity produces depression. Some research indicates that ECT stimulates neurogenesis (new neurons) and new synaptic connections within the hippocampus and amygdala (Joshi et al., 2016; Rotheneichner et al., 2014).

No matter how impressive the results, the idea of electrically shocking a person’s brain still strikes many as barbaric, especially given our ignorance about why ECT works. Moreover, the mood boost may not last long. Many ECT-treated patients eventually relapse back into depression, although relapses are somewhat fewer for those who also receive antidepressant drugs or who do aerobic exercise (Rosenquist et al., 2016; Salehi et al., 2016). *The bottom line:* In the minds of many psychiatrists and patients, ECT is a lesser evil than severe depression’s misery, anguish, and risk of suicide. As research psychologist Norman Endler (1982) reported after ECT alleviated his deep depression, “A miracle had happened in two weeks.”

Alternative Neurostimulation Therapies

Three other neural stimulation techniques—mild cranial electrical stimulation, magnetic stimulation, and deep-brain stimulation—also aim to treat the depressed brain (**Figure 73.2**).



Electroconvulsive therapy (ECT) Psychiatrist administers a strong current, which triggers a seizure in the anesthetized patient.

Transcranial direct current stimulation (tDCS) Psychiatrist applies a weak current to the scalp.

Repetitive transcranial magnetic stimulation (rTMS) Psychiatrist sends a painless magnetic field through the skull to the surface of the cortex to alter brain activity.

Deep-brain stimulation (DBS) Psychiatrist stimulates electrodes implanted in "sadness centers" to calm those areas.

Figure 73.2
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Figure 73.2 A stimulating experience

Today's neurostimulation therapies apply strong or mild electricity, or magnetic energy, either to the skull's surface or directly to brain neurons.

TRANSCRANIAL ELECTRICAL STIMULATION

In contrast to ECT, which produces a brain seizure with about 800 milliamps of electricity, *transcranial direct current stimulation (tDCS)* administers a weak 1- to 2-milliamp current to the scalp. The current is so mild that some people have attempted to use tDCS machines to stimulate their own cognitive abilities, though skeptics argue that such a current is too weak to penetrate to the brain and that studies do not confirm cognitive benefits (Horvath et al., 2015; Underwood, 2016). After reviewing recent studies, two European expert panels did, however, report "probable efficacy" of tDCS as a depression treatment (Brunoni et al., 2016; Lefaucheur et al., 2017).

FYI

A meta-analysis of 17 clinical experiments found that one other stimulation procedure alleviates depression: massage therapy (Hou et al., 2010).

MAGNETIC STIMULATION

Depressed moods also sometimes improve when a painless procedure—called **repetitive transcranial magnetic stimulation (rTMS)**—is performed on wide-awake patients over several weeks. Repeated pulses surging through a magnetic coil held close to the skull can stimulate or suppress activity in areas of the cortex. Like tDCS (and unlike ECT), the rTMS procedure produces no memory loss or other serious side effects, aside from possible headaches.

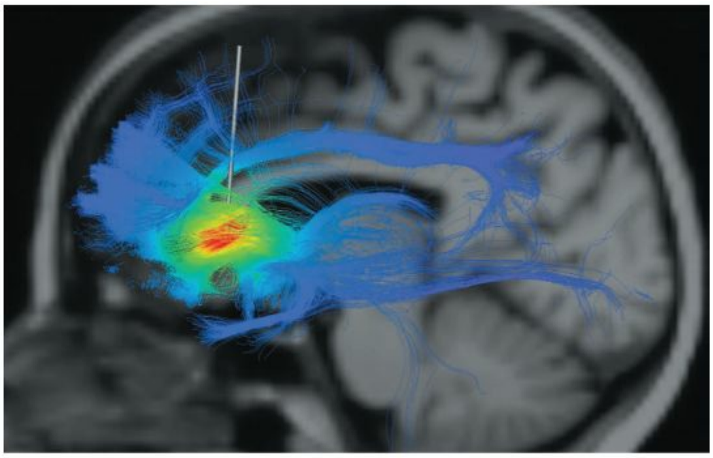
repetitive transcranial magnetic stimulation (rTMS)
the application of repeated pulses of magnetic energy to the brain; used to stimulate or suppress brain activity.

Some studies have found that, for 30 to 40 percent of people with depression, rTMS works (Becker et al., 2016; Brunoni et al., 2017; Taylor et al., 2017). How it works is unclear. One possible explanation is that the stimulation energizes the brain's left frontal lobe, which is relatively inactive during depression (Helmuth, 2001). Repeated stimulation may cause nerve cells to form new functioning circuits through the process of *long-term potentiation* (see Module 32 for more details on LTP). More research will shed light on how rTMS works, and for whom.

DEEP-BRAIN STIMULATION

Other patients whose depression has resisted both drugs and ECT have benefited from an experimental treatment pinpointing a neural hub that bridges the thinking frontal lobes to the limbic system (Becker et al., 2016; Brunoni et al., 2017; Ryder & Holtzheimer, 2016). This area, which is overactive in the brain of a depressed or temporarily sad person, calms when treated by ECT or antidepressants. To experimentally activate neurons that inhibit this negative activity, neuroscientist Helen Mayberg drew upon *deep-brain stimulation* (DBS) technology, sometimes used to treat Parkinson's tremors. Since 2003, she and her colleagues have used DBS to treat some 200 depressed patients via implanted electrodes in a brain area that functions as the neural "sadness center" (Lozano & Mayberg, 2015). About one-third reportedly have responded "extremely well" and another 30 percent have modestly improved (Underwood, 2013). Some felt suddenly more aware and became more talkative and engaged;

others improved only slightly, if at all. Other studies have found little benefit when DBS is compared to placebo electrode treatments (Witter & Ward, 2016). Future research will explore whether Mayberg has discovered a switch that can lift depression.



Helen Mayberg, M.D. Psychiatric Neuroimaging and Therapeutics, The Mayberg Lab at Emory University, Atlanta, GA/V. J. Wedeen and L. L.Wald/Athinoula A. Martinos Center For Biomedical Imaging and The Human Connectome Project, Boston, MA

A depression switch? By comparing the brains of patients with and without depression, researcher Helen Mayberg identified a brain area (highlighted in red) that appears active in people who are depressed or sad, and whose activity may be calmed by deep-brain stimulation.

Psychosurgery

Because its effects are irreversible, **psychosurgery**—surgery that removes or destroys brain tissue—is the most drastic and least-used biomedical intervention for changing behavior. In the 1930s, Portuguese physician Egas Moniz developed what would become the best-known psychosurgical operation: the **lobotomy**. Moniz found that cutting the nerves connecting the frontal lobes with the emotion-controlling centers of the inner brain calmed uncontrollably emotional and violent patients. In what would later become, in others' hands, a crude but quick and easy procedure, a neurosurgeon would shock the patient into a coma, hammer an icepick-like instrument through the top of each eye socket into the brain, and then wiggle it to sever connections running up to the frontal lobes. Between 1936 and 1954, tens of thousands of severely disturbed people were "lobotomized" (Valenstein, 1986).

psychosurgery

surgery that removes or destroys brain tissue in an effort to change behavior.

lobotomy

a psychosurgical procedure once used to calm uncontrollably emotional or violent patients. The procedure cut the nerves connecting the frontal lobes to the emotion-controlling centers of the inner brain.

New York Times Co./Getty Images

Failed lobotomy This 1940 photo shows Rosemary Kennedy (center) at age 22 with brother (and future U.S. president) John and sister Jean. A year later her father, on medical advice, approved a lobotomy that was promised to control her reportedly violent mood swings. The procedure left her confined to a hospital with an infantile mentality until her death in 2005 at age 86.

Although the intention was simply to disconnect emotion from thought, the effect was often more drastic. A lobotomy usually decreased the person’s misery or tension, but also produced a permanently lethargic, immature, uncreative person. During the 1950s, after some 35,000 people had been lobotomized in the United States alone, calming drugs became available and psychosurgery became scorned.

Today, lobotomies are history. More precise, microscale psychosurgery is sometimes used in extreme cases. For example, if a patient suffers uncontrollable seizures, surgeons can deactivate the specific nerve clusters that cause or transmit the convulsions. MRI-guided precision surgery is also occasionally done to cut the circuits involved in severe obsessive-compulsive disorder (Carey, 2009, 2011; Sachdev & Sachdev, 1997). Because these procedures are irreversible, neurosurgeons perform them only as a last resort.

* * *

Table 73.1 summarizes some aspects of the biomedical therapies we've discussed.

TABLE 73.1 Comparing Biomedical Therapies

Therapy	**Presumed Problem**	**Therapy Aim**	**Therapy Technique**
Therapeutic lifestyle change	Stress and unhealthy lifestyle	Restore healthy biological state.	Alter lifestyle through adequate exercise, sleep, nutrition, and other changes.
Drug therapies	Neurotransmitter malfunction	Control symptoms of psychological disorders.	Alter brain chemistry through drugs.
Brain stimulation	Depression (ECT is used only for severe, treatment-resistant depression.)	Alleviate depression, especially when it is unresponsive to drugs or other forms of therapy.	Stimulate brain through electroconvulsive shock, mild electrical stimulation, magnetic impulses, or deep-brain stimulation.
Psychosurgery	Brain malfunction	Relieve severe disorders.	Remove or destroy brain tissue.

✓ Check Your Understanding

Ask Yourself

- If a troubled friend asked, how would you summarize the available biomedical therapies?

Test Yourself

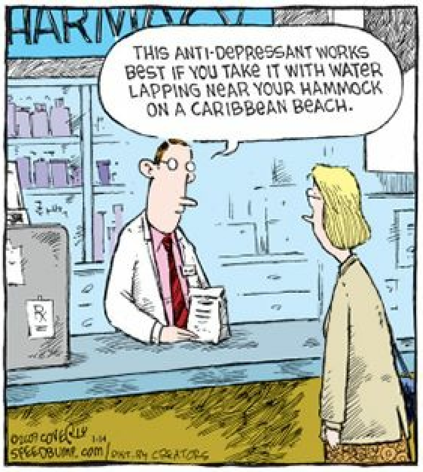
- How do researchers determine if particular drug therapies are effective?
- The drugs given most often to treat depression are called _______________. Schizophrenia is often treated with _______________ drugs.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Preventing Psychological Disorders and Building Resilience

73-4 What is the rationale for preventive mental health programs, and why is it important to develop resilience?

Psychotherapies and biomedical therapies tend to locate the cause of psychological disorders within the person. We infer that people who act cruelly must be cruel and that people who act “crazy” must be “sick.” We attach labels to such people, thereby distinguishing them from “normal” folks. It follows, then, that we try to treat “abnormal” people by giving them insight into their problems, by changing their thinking, by helping them gain control with drugs.


THIS ANTI-DEPRESSANT WORKS BEST IF YOU TAKE IT WITH WATER LAPPING NEAR YOUR HAMMOCK ON A CARIBBEAN BEACH.
SPEEDBUMP.com / DIST. BY CREATORS

Dave Coverly/Speed Bump

There is an alternative viewpoint: We could interpret many psychological disorders as understandable responses to a disturbing and stressful society. According to this view, it is not just the person who needs treatment, but also the person’s social context. Better to prevent a problem by reforming an unhealthy situation and by developing people’s coping competencies than to wait for and treat problems.

Preventive Mental Health

A story about the rescue of a drowning person from a rushing river illustrates this viewpoint: Having successfully administered first aid to the first victim, the rescuer spots another struggling person and pulls her out, too. After a half-dozen repetitions, the rescuer suddenly turns and starts running away while the river sweeps yet another floundering person into view. “Aren’t you going to rescue that fellow?” asks a bystander. “Heck no,” the rescuer replies. “I’m going upstream to find out what’s pushing all these people in.”

Preventive mental health is upstream work. It seeks to prevent psychological casualties by identifying and alleviating the conditions that cause them. As George Albee (1986, 2006) pointed out, there is abundant evidence that poverty, meaningless work, constant criticism, unemployment, racism, and sexism undermine people’s sense of competence, personal control, and self-esteem. Such stresses increase their risk of depression, alcohol use disorder, and suicide.

> “*It is better to prevent than to cure.*”
>
> *Peruvian folk wisdom*

To prevent psychological casualties we should, Albee contended, support programs that alleviate these demoralizing situations. We eliminated smallpox not by treating the afflicted but by inoculating the unafflicted. We conquered yellow fever by controlling mosquitoes. Better to drain the swamps than swat the mosquitoes.

Preventing psychological problems means empowering those who have learned an attitude of helplessness and changing environments that breed loneliness. It means renewing fragile family ties and boosting parents’ and teachers’ skills at nurturing children’s competence and belief in their abilities. It means harnessing positive psychology interventions to enhance human flourishing. In short, “everything aimed at improving the human condition, at making life more fulfilling and meaningful, may be considered part of primary prevention of mental or emotional disturbance” (Kessler & Albee, 1975, p. 557). Prevention can sometimes provide a double payoff. People with a strong sense of life’s meaning are more engaging socially (Stillman et al., 2011). If we can strengthen people's sense of meaning in life, we may also lessen their loneliness as they grow into more engaging companions.

Among the upstream prevention workers are *community psychologists.* Mindful of how people interact with their environment, they focus on creating environments that support psychological health. Through their research and social action, community psychologists aim to empower people and to enhance their competence, health, and well-being.

> “ *Mental disorders arise from physical ones, and likewise physical disorders arise from mental ones.* ”
>
> The Mahabharata, *200 B.C.E.*

Building Resilience

Preventive mental health includes efforts to build individuals' **resilience**—the ability to cope with stress and recover from adversity.

resilience

the personal strength that helps most people cope with stress and recover from adversity and even trauma.

Faced with unforeseen trauma, most adults exhibit resilience. This was true of New Yorkers in the aftermath of the September 11 terror attacks, especially those who enjoyed supportive close relationships and who had not recently experienced other stressful events (Bonanno et al., 2007). More than 9 in 10 New Yorkers, although stunned and grief-stricken by 9/11, did *not* have a dysfunctional stress reaction. Among those who did, the stress symptoms were mostly gone by the following January (Person et al., 2006). Even most combat-stressed veterans, most political rebels who have survived torture, and most people with spinal cord injuries do not later exhibit posttraumatic stress disorder (Bonanno et al., 2012; Mineka & Zinbarg, 1996).

Struggling with challenging crises can even lead to **posttraumatic growth**. Many cancer survivors have reported a greater appreciation for life, more meaningful relationships, increased personal strength, changed priorities, and a richer spiritual life (Tedeschi & Calhoun, 2004). Americans who tried to make sense of the 9/11 terror attacks experienced less distress (Park et al., 2012). Out of even our worst experiences, some good can come, especially when we can imagine new possibilities (Roepke, 2015; Roepke & Seligman, 2015). Suffering can beget new sensitivity and strength.

posttraumatic growth
positive psychological changes as a result of struggling with extremely challenging circumstances and life crises.

✓ Check Your Understanding

Ask Yourself

- Can you think of a specific way that improving the environment in your own community might prevent some psychological disorders among its residents?

Test Yourself

- Severe depression that has not responded to other therapy may be treated with _______________ _______________, which can cause brain seizures and memory loss. More moderate neural stimulation techniques designed to help alleviate depression include _______________ direct current stimulation, _______________ _______________ magnetic stimulation, and _______________-_______________ stimulation.
- What is the difference between preventive mental health and the psychological and biomedical therapies?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 73 REVIEW

73-1 Why is therapeutic lifestyle change considered an effective biomedical therapy, and how does it work?

- Therapeutic lifestyle change is considered a biomedical therapy because it influences the way the brain responds. Mind and body are a unit; affect one and you will affect the other. Our exercise, nutrition, relationships, recreation, relaxation, and religious or spiritual engagement affect our mental health.
- People who undergo a program of aerobic exercise, adequate sleep, light exposure, social engagement, rumination reduction, and better nutrition have gained relief from depressive symptoms.

73-2 What are the drug therapies? How do double-blind studies help researchers evaluate a drug's effectiveness?

- *Psychopharmacology,* the study of drug effects on mind and behavior, has helped make drug therapy the most widely used biomedical therapy.
- *Antipsychotic drugs,* used in treating schizophrenia, block dopamine activity. Side effects may include tardive dyskinesia (with involuntary movements of facial muscles, tongue, and limbs) or increased risk of obesity and diabetes.
- *Antianxiety drugs,* which depress central nervous system activity, are used to treat anxiety disorders, obsessive-compulsive disorder, and posttraumatic stress disorder. These drugs can be physically and psychologically addictive.
- *Antidepressant drugs,* which increase the availability of serotonin and norepinephrine, are used for depression, often with modest effectiveness beyond that of placebo drugs. The antidepressants known as selective serotonin reuptake inhibitors (SSRIs) are now used to treat other disorders, including strokes, anxiety disorders, obsessive-compulsive

disorder, and posttraumatic stress disorder.

- Lithium and Depakote are mood stabilizers prescribed for those with bipolar disorder.
- Studies may use a double-blind procedure to avoid the placebo effect and researchers’ bias.

73-3 How are brain stimulation and psychosurgery used in treating specific disorders?

- *Electroconvulsive therapy (ECT)*, in which a brief electric current is sent through the brain of an anesthetized patient, is an effective treatment for people with severe depression who have not responded to other therapy.
- *Transcranial direct current stimulation (tDCS)* administers a far weaker current to the scalp.
- Newer alternative treatments for depression include *repetitive transcranial magnetic stimulation (rTMS)* and, in preliminary clinical experiments, deep-brain stimulation that calms an overactive brain region linked with negative emotions.
- *Psychosurgery* removes or destroys brain tissue in hopes of modifying behavior.
  - Radical psychosurgical procedures such as the *lobotomy* were once popular, but neurosurgeons now rarely perform brain surgery to change behavior or moods.
  - Brain surgery is a last-resort treatment because its effects are irreversible.

73-4 What is the rationale for preventive mental health programs, and why is it important to develop resilience?

- Preventive mental health programs are based on the idea that many psychological disorders could be prevented by changing oppressive, esteem-destroying environments into more benevolent, nurturing environments that foster growth, self-confidence, and *resilience*.

- Building resilience might prevent some disorders or even enable *posttraumatic growth*.

Multiple-Choice Questions

1. Which neurotransmitter is affected by antipsychotic medications?

  a. Epinephrine
  b. Dopamine
  c. Norepinephrine
  d. Acetylcholine
  e. Serotonin

2. Which of the following is most effectively treated with electroconvulsive therapy (ECT)?

  a. Psychosis
  b. Schizophrenia
  c. Obsessive-compulsive disorder
  d. Depression
  e. Generalized anxiety disorder

3. Having been diagnosed with bipolar disorder, Patricia has been prescribed **_____** to level the highs and lows of the disorder.

  a. Xanax
  b. Lithium
  c. Zoloft
  d. Paxil
  e. Ativan

4. Juliette's depression is not responding to the normal biomedical treatments. Her therapist has suggested that she try several sessions of _____ to energize her left frontal lobe and reduce her symptoms.

  a. psychosurgery
  b. rTMS
  c. ECT
  d. CBT

e. REBT

Practice FRQs

1. Francisco has been diagnosed with major depressive disorder. Explain how each of the following might alleviate his symptoms.
   - SSRIs
   - Deep-brain stimulation

Answer

1 point: SSRIs would help alleviate Francisco’s symptoms by making more serotonin available to neurons. By increasing the levels of serotonin, his symptoms should be reduced. Page 754

1 point: Deep-brain stimulation uses implanted electrodes to target an area of the brain where the frontal lobes connect to the limbic system—an area that tends to be overactive in people with depression. Inhibiting negative activity in this way for Francisco should help relieve his symptoms. Page 757

2. Briefly describe four therapeutic lifestyle changes and their mental health benefits.

(4 points)

UNIT XIII **REVIEW**

KEY TERMS AND CONCEPTS TO REMEMBER

psychotherapy, p. 722

biomedical therapy, p. 722

eclectic approach, p. 723

psychoanalysis, p. 723

resistance, p. 723

interpretation, p. 723

transference, p. 724

psychodynamic therapy, p. 724

insight therapies, p. 725

client-centered therapy, p. 725

active listening, p. 726

unconditional positive regard, p. 726

behavior therapy, p. 729

counterconditioning, p. 729

exposure therapies, p. 730

systematic desensitization, p. 730

virtual reality exposure therapy, p. 730

aversive conditioning, p. 731

token economy, p. 732

cognitive therapy, p. 733

rational-emotive behavior therapy (REBT), p. 733

cognitive-behavioral therapy (CBT), p. 736

group therapy, p. 737

family therapy, p. 737

meta-analysis, p. 743

evidence-based practice, p. 744

therapeutic alliance, p. 747
psychopharmacology, p. 753
antipsychotic drugs, p. 753
antianxiety drugs, p. 754
antidepressant drugs, p. 754
electroconvulsive therapy (ECT), p. 756
repetitive transcranial magnetic stimulation (rTMS), p. 757
psychosurgery, p. 758
lobotomy, p. 758
resilience, p. 760
posttraumatic growth, p. 760

KEY CONTRIBUTORS TO REMEMBER

Sigmund Freud, p. 723
Carl Rogers, p. 725
Mary Cover Jones, p. 730
Joseph Wolpe, p. 730
B. F. Skinner, p. 732
Albert Ellis, p. 733
Aaron Beck, p. 734

AP® Exam Practice Questions

Multiple-Choice Questions

1. In an effort to help a child overcome a fear of cats, a therapist pairs a trigger stimulus (something associated with cats) with a new stimulus (for example, an appealing snack or toy) that causes an emotional response that is incompatible with fear. Which clinical orientation is this therapist using?

a. Psychodynamic
b. Behavioral

c. Biomedical
d. Client-centered
e. Humanistic

2. Which of the following is a similarity between humanistic and psychoanalytic therapies?

a. Both approaches focus on the present more than the past.
b. Both approaches are more concerned with conscious than with unconscious feelings.
c. Both approaches focus on taking immediate responsibility for one’s feelings.
d. Both approaches focus on personal growth instead of curing illness.
e. Both approaches are generally considered insight therapies.

3. Lea, a client with depression, has been visiting a therapist for several months. During each session, she is challenged on her irrational thinking. The therapist is likely using Albert Ellis’ version of

a. rational-emotive behavioral therapy.
b. aversive conditioning.
c. insight therapy.
d. client-centered therapy.
e. rTMS.

4. Some patients whose depression resists drugs have benefited from which experimental treatment?

a. Transference
b. Meta-analysis
c. Antipsychotic drugs
d. Deep-brain stimulation
e. Resistance

5. Carlos has been prescribed an SSRI to treat his illness. This type of drug is classified as a(n)

a. antidepressant.
b. antipsychotic.

c. antianxiety.
d. mood-stabilizer.
e. bipolar disorder drug.

6. Which of the following is seen as an effective treatment for severe depression that does not respond to drug therapy?

a. Lobotomy
b. Token economy
c. ECT
d. Classical conditioning
e. EMDR therapy

7. Echoing, restating, and seeking clarification of what a person expresses (verbally or nonverbally) in a therapy session is called

a. active listening.
b. virtual reality exposure therapy.
c. systematic desensitization.
d. family therapy.
e. classical conditioning.

8. Challenging people’s automatic negative thoughts is a key characteristic of the therapy developed by

a. Sigmund Freud.
b. B. F. Skinner.
c. Aaron Beck.
d. Gordon Allport.
e. Carl Rogers.

9. In which kind of therapy would the therapist be most likely to note the following during a session: “Blocks in the flow of free associations indicate resistance”?

a. Cognitive therapy
b. Psychoanalysis
c. Client-centered therapy
d. Behavioral therapy

e. Person-centered therapy

0. Therapists who encourage their clients to change their thoughts and their actions are engaging in

a. aversive conditioning.
b. psychodynamic therapy.
c. client-centered therapy.
d. family therapy.
e. cognitive-behavioral therapy.

1. Allowing people to discover, in a social context, that others have problems similar to their own is a unique benefit of

a. psychodynamic therapy.
b. psychopharmacological therapy.
c. humanistic therapy.
d. cognitive therapy.
e. group therapy.

2. Which of the following therapeutic approaches is scientifically supported?

a. Recovered-memory therapies
b. Rebirthing therapies
c. Cognitive therapy
d. Energy therapies
e. Facilitated communication therapy

3. Most antipsychotic drugs mimic a certain neurotransmitter by blocking its activity at the receptor sites. These drugs affect the neurotransmitter

a. adrenaline.
b. epinephrine.
c. serotonin.
d. dopamine.
e. acetylcholine.

4. Which of the following is *not* recommended by therapists as a way to help prevent or get over depression?

a. Recovered-memory therapies
b. Aerobic exercise
c. Light exposure
d. Increased social connections
e. Anti-rumination strategies

5. A psychotherapist states, “Getting people to change what they say to themselves is an effective way to change their thinking.” This statement best exemplifies which kind of therapeutic approach?

a. Behavioral
b. Psychodynamic
c. Biomedical
d. Cognitive
e. Active listening

6. Treatment for obsessive-compulsive disorder could include

a. antianxiety drugs.
b. antidepressant drugs.
c. lithium.
d. a & b only
e. b & c only

7. Colten visits a therapist for his depression. In addition to talking to Colten about his problems, the therapist also prescribes medication. This therapist is most likely to be a

a. psychiatrist.
b. clinical psychologist.
c. social worker.
d. clinical social worker.
e. counselor.

8. After overcoming severe anxiety and dealing with some physical health issues, Grace finds herself having a greater appreciation for life and a sense of increased personal strength. Her psychotherapist identifies this as

a. transference.
b. resistance.
c. posttraumatic growth.
d. humanism.
e. behavior modification.

9. When used in conjunction with antidepressant drugs, ______ is especially effective in the treatment of depression.

a. psychosurgery
b. behavior modification therapy
c. cognitive-behavioral therapy
d. client-centered therapy
e. insight therapy

0. Therapists who help people understand their current symptoms by focusing on important relationships, including childhood experiences and the therapist-client relationship, are most likely to be considered

a. biomedical therapists.
b. psychoanalytic therapists.
c. humanistic therapists.
d. psychodynamic therapists.
e. exposure therapists.

Free-Response Questions

1. Your friend Lawrence recently confided in you that he has been diagnosed with major depressive disorder. He has been offered several different kinds of treatment: psychodynamic therapy, exposure therapy, REBT, SSRIs, and rTMS. Explain what you would tell Lawrence about how each type of therapy works and whether research indicates that it might be an effective treatment for major depressive disorder.

Rubric for Free Response Question 1

1 point: Psychodynamic therapy involves a therapist and client working together to gain insight about a client’s unconscious conflicts and childhood experiences. Outcome research indicates that psychodynamic therapy has had success in alleviating depression symptoms. Page 724

1 point: To extinguish fear or anxiety, exposure therapy repeatedly brings people into contact with fear-or anxiety-arousing stimuli. This type of therapy is specifically focused on reducing anxiety and fear and is not designed to treat depression. Page 730

1 point: Albert Ellis’ rational-emotive behavior therapy (REBT), a type of cognitive therapy, attempts to stop irrational thinking by challenging a person’s illogical, self-defeating assumptions. Since many of the symptoms of depression involve negative, pessimistic thinking, REBT is worth exploring as a treatment for depression. Page 733

1 point: SSRIs, such as Zoloft, Paxil, and Prozac, work by partially blocking the reabsorption and removal of serotonin from synapses. Having more serotonin remain in the synapses has been shown to help reduce the symptoms of depression. Page 754

1 point: Repetitive transcranial magnetic stimulation (rTMS) sends repeated pulses of magnetic energy into the brain, usually into the left frontal lobe. This approach has shown effectiveness in the treatment of depression. Page 757

2. For each of the following pairs, first define the treatment referenced. Then explain the rationale for using that treatment for an individual with the disorder indicated.

- Bipolar disorder and drug therapy
- Phobias and systematic desensitization
- Dissociative identity disorder and psychoanalysis
- Addiction and group therapy
- Depression and rational-emotive behavior therapy (REBT)

(5 points)

2. Max wants to stop smoking but is unable to do so on his own. How would a therapist from each of the following approaches attempt to help him stop smoking?

- Psychoanalytic
- Cognitive
- Behavioral

(3 points)

UNIT XIV Social Psychology

Pete Saloutos/Blend Images/Getty Images

MODULES

74 Attribution, Attitudes, and Actions

75 Conformity and Obedience

76 Group Behavior

77 Prejudice and Discrimination

78 Aggression

79 Attraction

80 Altruism, Conflict, and Peacemaking

Dirk Willems faced a moment of decision in 1569. Threatened with torture and death as a member of a persecuted religious minority, he escaped from his Asperen, Holland, prison and fled across an ice-covered pond. His stronger and heavier jailer pursued him but fell through the ice and, unable to climb out, pleaded for help.

With his freedom in front of him, Willems acted with ultimate selflessness. He turned back and rescued his pursuer, who, under orders, took him back to captivity. A few weeks later Willems was condemned to be "executed with fire, until death ensues." For his martyrdom, present-day Asperen has named a street in honor of its folk hero *(Toews, 2004)*.

What drives people to feel contempt for minority-group members, such as Dirk Willems, and to act so spitefully? What motivates people, such as his jailer, to carry out unfair orders? And what inspired the selflessness of Willems' response, and of so many who have died trying to save others? Indeed, what motivates any of us who volunteer kindness and generosity toward others?

As such examples demonstrate, we are social animals. We cannot live for ourselves alone, for we are connected with others by "a thousand fibres" through which "run [our] actions as causes, and return to [us] as effects" (Melvill, 1855). *Social psychologists* explore these connections by scientifically studying how we *think about*, *influence*, and *relate to* one another.

Unit XIV Overview Video

Module **74 Attribution, Attitudes, and Actions**

LEARNING TARGETS

- 74-1 Identify what social psychologists study, and discuss how we tend to explain others' behavior and our own.
- 74-2 Discuss how our attitudes and actions interact.

74-1 What do social psychologists study? How do we tend to explain others' behavior and our own?

Personality psychologists (Unit X) focus on the person. They study the personal traits and dynamics that explain why, in a given situation, *different people* act differently. (Would you have acted as Willems did, helping the jailer out of the icy water?) **Social psychologists** focus on the situation. They study the social influences that explain why *the same person* acts differently in *different situations*. (Might the jailer have acted differently—opting not to march Willems back to jail—under differing circumstances?)

social psychology

the scientific study of how we think about, influence, and relate to one another.

The Fundamental Attribution Error

Our social behavior arises from our social thinking (“social cognition”). Especially when the unexpected occurs, we want to understand and explain why people act as they do. After studying how people explain others’ behavior, Fritz Heider (1958) proposed an **attribution theory**: We can credit (attribute) the behavior to the person’s stable, enduring traits (a *dispositional attribution*), or we can attribute it to the situation (a *situational attribution*).

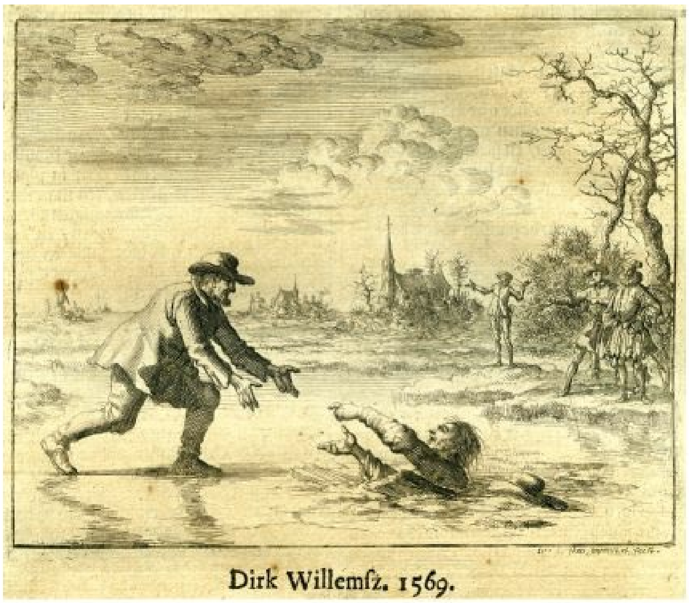
attribution theory

the theory that we explain someone’s behavior by crediting either the situation or the person’s disposition.

For example, in class, we notice that Juliette seldom talks. At the cafeteria, Jack talks nonstop. That must be the sort of people they are, we decide. Juliette must be shy and Jack outgoing. Such attributions—to their dispositions—can be valid. People do have enduring personality traits. But sometimes we fall prey to the **fundamental attribution error** (Ross, 1977): We overestimate the influence of personality and underestimate the influence of situations. In class, Jack may be as quiet as Juliette. Catch Juliette as the lead in the high school musical and you may hardly recognize your quiet classmate.

fundamental attribution error

the tendency for observers, when analyzing others’ behavior, to underestimate the impact of the situation and to overestimate the impact of personal disposition.


Dirk Willemſz. 1569.

Mennonite Library and Archives/Bethel College

An etching of Dirk Willems by Dutch artist Jan Luyken (from *The Martyrs Mirror,* 1685)

The fundamental attribution error was demonstrated in an experiment with Williams College students (Napolitan & Goethals, 1979). They had students talk, one at a time, with a woman who acted either cold and critical or warm and friendly. Before the conversations, the researchers told half the students that the woman's behavior would be spontaneous. They told the other half the truth—that they had instructed her to *act* friendly (or unfriendly).

Did hearing the truth affect students' impressions of the woman? Not at all! If the woman acted friendly, both groups decided she really was a warm person. If she acted unfriendly, both decided she really was a cold person. They attributed her behavior to her personal disposition *even when told that her behavior was situational*—that she was merely acting that way for the purposes of the experiment.

We all commit the fundamental attribution error. Consider: Is your AP® psychology teacher shy or outgoing?

If you answer "outgoing," remember that you know your teacher from only one situation—the classroom, where teaching demands talking. Your teacher might disagree: "Me, outgoing? It all depends on the situation. In class or with good friends, yes, I'm outgoing. But at professional meetings I'm really rather shy." Outside their assigned roles, teachers seem less teacherly, presidents less presidential, managers less managerial.

FYI

Unlike sociology, which studies societies and social groupings, social psychologists focus more on how *individuals* view and affect one another.

What Factors Affect Our Attributions?

One factor is culture. Individualist Westerners more often attribute behavior to people’s personal traits. People in East Asian cultures are somewhat more sensitive to the power of the situation (Kitayama et al., 2009; Riemer et al., 2014). In experiments that asked people to view scenes, such as a big fish swimming, Americans focused on the attributes of the individual fish. Japanese viewers focused more on the whole scene—the situation (Chua et al., 2005; Nisbett, 2003).

AP® EXAM TIP

Many students have not heard of the fundamental attribution error before taking a course in psychology. Be sure you can define the concept (which may appear on the AP® exam). Try illustrating this concept using your own attributions and those of others as examples.

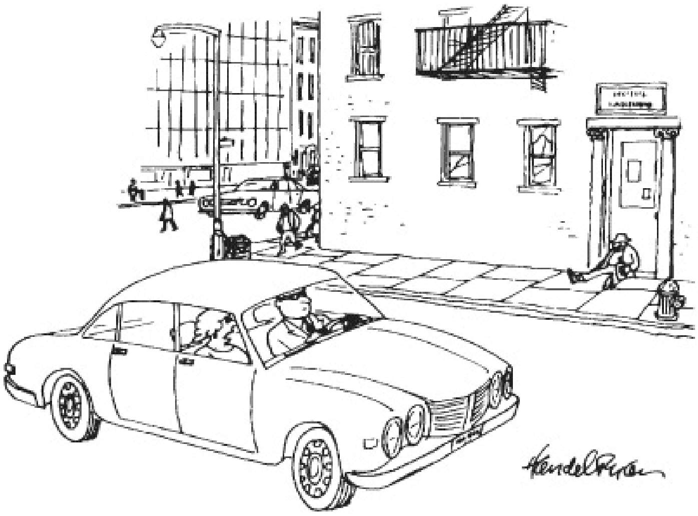
When we explain *our own* behavior, we are sensitive to how behavior changes with the situation (Idson & Mischel, 2001). After behaving badly, for example, we recognize how the situation affected our actions (recall the *self-serving bias* discussed in Module 59). We also are sensitive to the power of the situation when we explain the behavior of people we have seen in many different contexts. We more often commit the fundamental attribution error when a stranger acts badly. Having only seen that enraged fan screaming at the referee in the heat of competition, we may assume he is a bad person. But outside the stadium, he may be a good neighbor and a great parent.

As we act, our eyes look outward; we see others' faces, not our own. Would taking an observer's viewpoint make us more aware of our own personal style? Researchers tested this idea by using separate cameras to film two people interacting. When they showed each person a replay of the interaction—filmed from the other person's perspective—participants credited their own behavior more to their disposition, much as an observer typically would (Lassiter & Irvine, 1986; Storms, 1973).

There are two important exceptions to our usual view of our own actions: Our deliberate and *admirable* actions we often attribute to our own good reasons, not to the situation (Malle, 2006; Malle et al., 2007). And as we age, we tend to attribute our younger selves' behavior mostly to our traits (Pronin & Ross, 2006).

How Do Our Attributions Matter?

The way we explain others' actions (attributing them to the person or the situation) can have important real-life effects (Fincham & Bradbury, 1993; Fletcher et al., 1990). Does a warm greeting reflect romantic interest or social courtesy? Does a manager's criticism reflect a job threat or a bad day? Was a shooting malicious or an act of self-defense? Attributions matter.



J. B. Handelsman The New Yorker Collection/The Cartoon Bank

"Otis, shout at that man to pull himself together."

Do you attribute poverty and unemployment to social circumstances or to personal traits? In Britain, India, Australia, and the United States, political conservatives have tended to attribute responsibility to the personal dispositions of the poor and unemployed (Furnham, 1982; Pandey et al., 1982; Wagstaff, 1982; Zucker & Weiner, 1993). “People generally get what they deserve. Those who take initiative can still get ahead.” In experiments, those who reflect on the power of choice—either by recalling their own choices or taking note of another’s choices—become more likely to think that people get what they deserve (Savani & Rattan, 2012). Political liberals, and those not primed to consider the power of choice, are more likely to blame past and present situations: “If you or I had to live with the same poor education, lack of opportunity, and discrimination, would we be any better off?”

Lee Snider/The Image Works

An attribution question Whether we attribute poverty and homelessness to social circumstances or to personal dispositions affects and reflects our political views.

Richard Ellis/Alamy

Dispositional versus situational attributions Should the 2015 slaughter of nine African-Americans attending a church Bible study in Charleston, West Virginia, be attributed to the shooter’s disposition? (“There is one person to blame here. A person filled with hate,” said South Carolina governor Nikki Haley.) Or to America’s gun culture? (“At some point, we as a country will have to reckon with the fact that this type of mass violence does not happen in other advanced countries . . . with this kind of frequency,” said President Obama.) Or to both?

FYI

Some 7 in 10 college women report having experienced a man misattributing her friendliness as a sexual come-on (Jacques-Tiura et al., 2007).

The point to remember: Our attributions—to a person’s disposition or to the situation—have real consequences.

Attitudes and Actions

74-2 How do attitudes and actions interact?

Attitudes are feelings, often influenced by our beliefs, that predispose our reactions to objects, people, and events. If we *believe* someone is threatening us, we may *feel* fear and anger toward the person and *act* defensively. The traffic between our attitudes and our actions is two-way. Our attitudes affect our actions. And our actions affect our attitudes (much as our emotional expressions can affect our emotions).

attitude

feelings, often influenced by our beliefs, that predispose us to respond in a particular way to objects, people, and events.

Attitudes Affect Actions

In any debate, people on both sides attempt to convert the opposition and sway the undecided. Persuaders try to influence our behavior by changing our attitudes. But situational factors, such as strong social pressures, can override the attitude-behavior connection (Wallace et al., 2005). In roll-call votes, politicians may vote as their supporters demand, despite privately disagreeing (Nagourney, 2002).

Attitudes are especially likely to affect behavior when external influences are minimal, and when the attitude is stable, specific to the behavior, and easily recalled (Glasman & Albarracín, 2006). One experiment used vivid, easily recalled information to persuade White suntanning college students that repetitive tanning put them at risk for future skin cancer. One month later, 72 percent of the participants, and only 16 percent of those in a waitlist control group, had lighter skin (McClendon & Prentice-Dunn, 2001). Persuasion changed attitudes (about skin cancer risk), which changed behavior (less tanning).

Efforts to *persuade* generally take two forms:

- **Peripheral route persuasion** uses attention-getting cues to trigger emotion-based snap judgments. Endorsements by beautiful or famous people can influence people’s attitudes, whether the judgment is about choosing a political candidate or buying the latest smart phone. When green activist film star Leonardo DiCaprio urges action to counter climate change, or when Pope Francis (2015) states that “Climate change is a global problem with grave implications,” they hope to harness their credibility for peripheral route persuasion. Even if it doesn’t engage systematic thinking, it may produce fast results. The same is true of heart-tugging ads for greeting cards, pet adoption, or support for the starving.
- **Central route persuasion** offers evidence and arguments that trigger careful thinking. To persuade buyers to purchase a particular phone, an ad might itemize the phone’s great features. To marshal support for climate change intervention, effective arguments have focused on accumulating greenhouse gases, melting Arctic ice, rising world temperatures and seas, and extreme weather (van der Linden et al., 2015). Central route persuasion works well for people who are naturally analytical or involved in an issue. And because it is more thoughtful and less superficial, it is more durable.

peripheral route persuasion

occurs when people are influenced by incidental cues, such as a speaker’s attractiveness.

central route persuasion

occurs when interested people focus on the arguments and respond with favorable thoughts.

AP® EXAM TIP

Be sure you can identify examples of peripheral route persuasion and central route persuasion, and that you understand the difference.

Actions Affect Attitudes

Now consider a more surprising principle: Not only will we stand up for what we believe, we also will more strongly believe in what we have stood up for. Many streams of evidence confirm that *attitudes follow behavior* (**Figure 74.1**).

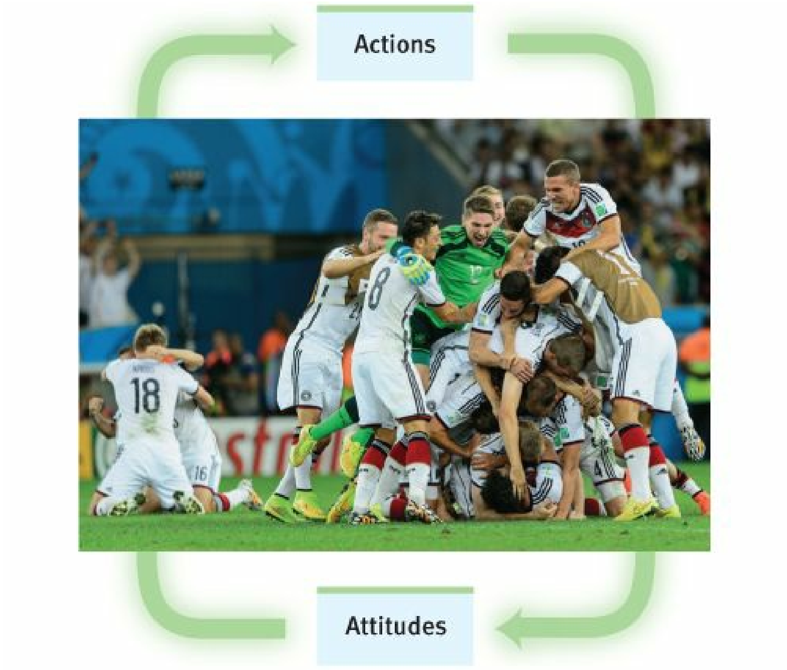


Figure 74.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e,
© 2018 Worth Publishers
Matthias Hangst/Getty Images

Figure 74.1 Attitudes follow behavior

Cooperative actions, such as those performed by people on sports teams (including Germany, shown here celebrating a World Cup victory), feed mutual liking. Such attitudes, in turn, promote positive behavior.

The Foot-in-the-Door Phenomenon

How would you react if someone induced you to act against your beliefs? In many cases, people adjust their attitudes. During the Korean war, many

U.S. prisoners were held in Chinese communist war camps. Without using brutality, the captors secured prisoners' collaboration in various activities, ranging from simple tasks (running errands to gain privileges) to more serious actions (false confessions, informing on other prisoners, and divulging military information). When the war ended, 21 prisoners chose to stay with the communists. More returned home "brainwashed"—convinced that communism was a good thing for Asia.

How did the Chinese captors achieve these amazing results? A key ingredient was their use of the **foot-in-the-door phenomenon**: They knew that people who agree to a small request will find it easier to comply later with a larger one. The Chinese began with harmless requests, such as copying a trivial statement, but gradually escalated their demands (Schein, 1956). The next statement to be copied might list flaws of capitalism. Then, to gain privileges, the prisoners participated in group discussions, wrote self-criticisms, or uttered public confessions. After doing so, they often adjusted their beliefs to be more consistent with their public acts. The point is simple: To get people to agree to something big, start small and build (Cialdini, 1993). A trivial act makes the next act easier. Succumb to a temptation and you will find the next temptation harder to resist.

foot-in-the-door phenomenon

the tendency for people who have first agreed to a small request to comply later with a larger request.

In dozens of experiments, researchers have coaxed people into acting against their attitudes or violating their moral standards, with the same result: Doing becomes believing. After giving in to a request to harm an innocent victim—by making nasty comments or delivering presumed electric shocks—people begin to disparage their victim. After speaking or writing on behalf of a position they have qualms about, they begin to believe their own words.

Fortunately, the attitudes-follow-behavior principle works with good deeds as well. In one classic experiment, researchers sought permission to place a large "Drive Carefully" sign in people's front yards (Freedman & Fraser, 1966). The 17 percent rate of agreement soared to 76 percent among those who first did a small favor—placing a 3-inch-high "Be a Safe Driver" sign in their window.

> *"If the King destroys a man, that's proof to the King it must have been a bad man."*
>
> *Thomas Cromwell, in Robert Bolt's* A Man for All Seasons, *1960*

The foot-in-the-door tactic has helped boost charitable contributions, blood donations, and U.S. school desegregation. With the passage of the Civil Rights Act of 1964, school desegregation became law. In the years that followed, White Americans expressed diminishing racial prejudice. And as Americans in different regions came to act more alike—thanks to more uniform national standards against discrimination—they began to think more alike.

Role-Playing Affects Attitudes

When you adopt a new **role**—when you become a college student or begin a new job—you strive to follow the social prescriptions. At first, your behaviors may feel phony, because you are acting a role. Soldiers may at first feel they are playing war games. Before long, however, what began as play acting in the theater of life becomes *you*.

role

a set of expectations (norms) about a social position, defining how those in the position ought to behave.

Role playing morphed into real life in one famous and controversial study in which male college students volunteered to spend time in a simulated prison. Stanford psychologist Philip Zimbardo (1972) randomly assigned some volunteers to be guards. He gave them uniforms, clubs, and whistles and instructed them to enforce certain rules. Others became prisoners, locked in barren cells and forced to wear humiliating outfits. For a day or two, the volunteers self-consciously “played” their roles. Then the simulation became real—too real. Some guards developed disparaging attitudes and a third “became tyrannical,” devising cruel and degrading routines. One by one, the prisoners broke down, rebelled, or became passively resigned. After only six days, Zimbardo called off the study.

> “*Fake it until you make it.*”
>
> *Alcoholics Anonymous saying*

Critics question the reliability of Zimbardo’s results (Griggs, 2014). But this much seems true: Role playing can train people to become torturers in the real world (Staub, 1989). In the early 1970s, the Greek military government eased men into their roles. First, a trainee stood guard outside an interrogation cell. After this “foot in the door” step, he stood guard inside. Only then was he ready to become actively involved in the questioning and torture. In one study of German men, military training toughened their personalities, leaving them less agreeable even five years later, after leaving the military (Jackson et al., 2012). What we do, we gradually become: Every time we act like the people around us, we slightly change ourselves to be more like them, and less like who we used to be.

Yet people differ. In Zimbardo’s simulation and in real-life atrocity-producing situations, some people have succumbed to the situation and others have not (Haslam & Reicher, 2007, 2012; Mastroianni & Reed, 2006; Zimbardo, 2007). Person and situation interact.

Cognitive Dissonance: Relief From Tension

▶ Flip It Video: Cognitive Dissonance Theory

So far, we have seen that actions can affect attitudes, sometimes turning prisoners into collaborators, doubters into believers, and compliant guards into abusers. But why? One explanation is that when we become aware that our attitudes and actions don't coincide, we experience mental tension, or *cognitive dissonance*. Indeed, the brain regions that become active when people experience other forms of mental tension and negative arousal also become active when people experience cognitive dissonance (Harmon-Jones et al., 2015; Kitayama et al., 2013). To relieve this tension, according to Leon Festinger's (1957) **cognitive dissonance theory**, we often bring our attitudes into line with our actions.

cognitive dissonance theory

the theory that we act to reduce the discomfort (dissonance) we feel when two of our thoughts (cognitions) are inconsistent. For example, when we become aware that our attitudes and our actions clash, we can reduce the resulting dissonance by changing our attitudes.

Left: Philip G. Zimbardo; Right: AP Photo

The power of the situation In his 1972 Stanford Prison simulation, Philip Zimbardo created a toxic situation (left). Those assigned to the guard role soon degraded the prisoners. In real life in 2004, some U.S. military guards tormented Iraqi prisoners at the U.S.-run Abu Ghraib prison (right). To Zimbardo (2004, 2007), it was a bad barrel rather than a few bad apples that led to the Abu Ghraib atrocities: "When ordinary people are put in a novel, evil place, such as most prisons, Situations Win, People Lose."

Dozens of experiments have tested the cognitive dissonance theory. Many have made people feel responsible for behavior that clashed with their attitudes and had foreseeable consequences. As a participant in one of these experiments, you might agree for a measly $2 to help a researcher by writing an essay supporting something you don’t believe in (perhaps school uniforms). Feeling responsible for the statements (which are inconsistent with your attitudes), you would probably feel dissonance, especially if you thought your essay might influence an administrator. To reduce the uncomfortable tension, you might start believing your phony words. It’s as if we rationalize, “If I chose to do it (or say it), I must believe in it.” The less coerced and more responsible we feel for a troubling act, the more dissonance we feel. The more dissonance we feel, the more motivated we are to find and project consistency, such as changing our attitudes to help justify the act.

The attitudes-follow-behavior principle has a heartening implication: We cannot directly control all our feelings, but we can influence them by altering our behavior. (Recall from Module 42 the emotional effects of facial expressions and body postures.) If we are depressed, we can alter our attributions and explain events in more positive terms, with more self-acceptance and fewer self-put-downs (Rubenstein et al, 2016). If we are unloving, we can become more loving by behaving *as if* we were loving—by doing thoughtful things, expressing affection, giving affirmation. “Each time you ask yourself, ‘How should I act?’” observes Robert Levine (2016), “you are also asking, ‘Who is the person I want to become?’” That helps explain why teens’ doing volunteer work promotes a compassionate identity. Pretense can become reality. Conduct sculpts character. What we do we become.

> “*Sit all day in a moping posture, sigh, and reply to everything with a dismal voice, and your melancholy lingers. . . . If we wish to conquer undesirable emotional tendencies in ourselves, we must . . . go through the outward movements of those contrary dispositions which we prefer to cultivate.*”
>
> *William James*, Principles of Psychology, *1890*

The point to remember: We can act ourselves into a way of thinking about as easily as we can think ourselves into a way of acting.

✓ Check Your Understanding

Ask Yourself

- Do you have an attitude or tendency you would like to change? Using the attitudes-follow-behavior principle, how might you go about changing that attitude?

Test Yourself

- Driving to school one snowy day, Marco narrowly misses a car that slides through a red light. “Slow down! What a terrible driver,” he thinks to himself. Moments later, Marco himself slips through an intersection and yelps, “Wow! These roads are awful. The city plows need to get out here.” What social psychology principle has Marco just demonstrated? Explain.
- How do our attitudes and our actions affect each other?
- When people act in a way that is not in keeping with their attitudes, and then change their attitudes to match those actions, _______________ _______________ theory attempts to explain why.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 74 REVIEW

74-1 What do social psychologists study? How do we tend to explain others' behavior and our own?

- *Social psychologists* use scientific methods to study how people think about, influence, and relate to one another. They study the social influences that explain why the same person will act differently in different situations.
- When explaining others' behavior, we may—especially if we come from an individualist Western culture—commit the *fundamental attribution error* (underestimating the influence of the situation and overestimating the effects of stable, enduring traits). When explaining our own behavior, we more readily attribute it to the influence of the situation.

74-2 How do attitudes and actions interact?

- *Attitudes* are feelings, often influenced by our beliefs, that predispose us to respond in certain ways.
- *Peripheral route persuasion* uses incidental cues (such as celebrity endorsement) to try to produce fast but relatively thoughtless changes in attitudes.
- *Central route persuasion* offers evidence and arguments to trigger thoughtful responses.
- When other influences are minimal, attitudes that are stable, specific, and easily recalled can affect our actions.
- Actions can modify attitudes, as in the *foot-in-the-door phenomenon* (complying with a large request after having agreed to a small request) and role playing (acting a social part by following guidelines for expected behavior).
- When our attitudes don't fit with our actions, *cognitive dissonance*

theory suggests that we will reduce tension by changing our attitudes to match our actions.

Multiple-Choice Questions

1. Claire has had several car accidents that she blames on other drivers. When her boyfriend has an accident, she is quick to blame his carelessness behind the wheel. Claire's difference in blame is due to

a. peripheral route persuasion.
b. cognitive dissonance.
c. the fundamental attribution error.
d. the foot-in-the-door phenomenon.
e. central route persuasion.

2. A feeling, often influenced by a belief, that predisposes one to respond in a particular way to people and events is known as

a. central route persuasion.
b. a role.
c. social psychology.
d. the foot-in-the-door phenomenon.
e. an attitude.

3. The discomfort we feel when our attitudes are not in line with our actions is called

a. cognitive dissonance.
b. the power of the situation.
c. the foot-in-the-door phenomenon.
d. role playing.
e. the fundamental attribution error.

Practice FRQs

1. Explain how central route persuasion and peripheral route persuasion could be used by your school's cafeteria to increase lunch sales.

Answer

1 point: Central route persuasion would use facts, such as the health benefits of eating certain foods, or the value-pricing of the available options, to influence the students to purchase the food. Page 771

1 point: Peripheral route persuasion would focus more on emotion and might attempt to display the food in a very appetizing way to create an impulse decision to purchase the food. Page 771

2. Using the guards in the Zimbardo prison simulation as your example, explain the following psychological concepts:

- Foot-in-the-door phenomenon
- Power of the situation
- Cognitive dissonance

(3 points)

Module **75 Conformity and Obedience**

LEARNING TARGETS

- 75-1 Describe *social contagion*, and explain how conformity experiments reveal the power of social influence.
- 75-2 Explain what Milgram’s obedience experiments teach us about the power of social influence.
- 75-3 Discuss what the social influence studies teach us about ourselves and the power we have as individuals.

Social psychology’s great lesson is the enormous power of social influence. This influence stems in part from social **norms**—rules for expected and acceptable behavior. At high school, jeans are the norm; on New York’s Wall Street or London’s Bond Street, business attire is expected. When we know how to act, how to groom, how to talk, life functions smoothly.

norms
understood rules for accepted and expected behavior. Norms prescribe “proper” behavior.

But sometimes social pressure moves people in dreadful directions. Isolated with others who share their grievances, dissenters may gradually become rebels, and rebels may become terrorists. Suicides, bomb threats, airplane hijackings, and mass shootings all have a curious tendency to come in clusters. After a mass killing, the probability of another such attack increases for the ensuing 13 days (Towers et al., 2015). Let’s examine the pull of these social strings. How strong are they? How do they operate? When do we break them?

Conformity: Complying With Social Pressures

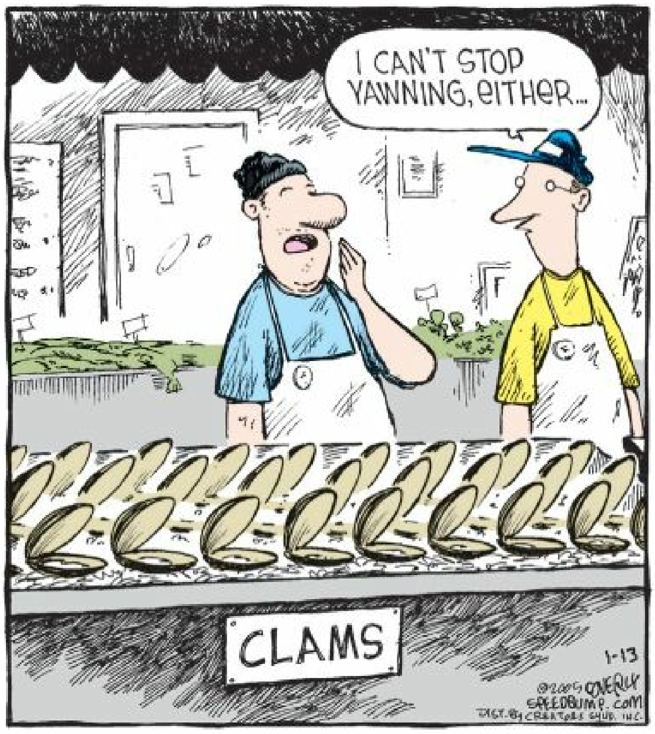
75-1 What is *social contagion*, and how do conformity experiments reveal the power of social influence?

Social Contagion

Fish swim in schools. Birds fly in flocks. And humans, too, tend to go with their group, to think what it thinks and do what it does. Behavior is contagious. If one of us yawns, laughs, coughs, scratches, stares at the sky, or checks our phone, others in our group will often do the same (Holle et al., 2012). Even just reading about yawning increases people's yawning (Provine, 2012), as perhaps you will notice? Yawn mimicry also occurs in other species—among chimpanzees, for example (Anderson et al., 2004)—and even across species: Dogs more often yawn after observing their owner yawn (Silva et al., 2012).

> “*Have you ever noticed how one example—good or bad—can prompt others to follow? How one illegally parked car can give permission for others to do likewise? How one racial joke can fuel another?*”
>
> *Marian Wright Edelman,* The Measure of Our Success, *1992*

Tanya Chartrand and John Bargh (1999) call this social contagion the *chameleon effect*, likening it to chameleon lizards' ability to take on the color of their surroundings. They captured it by having students work in a room alongside another person (actually a “confederate” working for the experimenters). Sometimes the confederates rubbed their own face. Sometimes they shook their foot. Sure enough, students tended to rub their face when with the face-rubbing person and shake their foot when with the foot-shaking person.


I CAN'T STOP YAWNING, EITHER...
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Social contagion is not confined to behavior. We human chameleons also take on the emotional tones of those around us—their expressions, postures, inflections—and even their grammar (Ireland & Pennebaker, 2010). Just hearing someone reading a neutral text in either a happy- or sad-sounding voice creates *mood contagion* in listeners (Neumann & Strack, 2000).

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Social contagion Laughter, like yawns, is infectious. That's what "Chewbacca Mom's" (Candace Payne's) viewers discovered after her spontaneous hilarity became, with 164 million views, Facebook Live's most watched 2016 video (tinyurl.com/ThatLaugh).

This natural mimicry enables us to *empathize*—to feel what others are feeling. This helps explain why we feel happier around happy people than around depressed people. It also helps explain why studies of groups of British workers have revealed *mood linkage*, or the sharing of moods (Totterdell et al., 1998). Empathic mimicking fosters fondness (Chartrand & van Baaren, 2009; Lakin et al., 2008). Perhaps you've noticed that when someone nods their head as you do and echoes your words, you feel a certain rapport and liking?

Social networks serve as contagious pathways for moods, such as happiness and loneliness, drug use, and even the behavior patterns that lead to obesity and sleep loss (Christakis & Fowler, 2009). On websites, positive ratings generate more positive ratings—a phenomenon called *positive herding* (Muchnik et al., 2013). In a massive experiment on the 2010 U.S. congressional election day, Facebook showed 61 million people a message that encouraged voting, with a link to a local voting place and a clickable “I voted” button. For some recipients, the messages also contained pictures of Facebook friends who had already voted. Those who received “tell your friends you voted” messages were slightly more likely to vote, and that difference generated an estimated 282,000 additional votes.

Suggestibility and mimicry sometimes lead to tragedy. In the eight days following the 1999 shooting rampage at Colorado’s Columbine High School, every U.S. state except Vermont experienced threats of copycat violence. Pennsylvania alone recorded 60 such threats (Cooper, 1999). Spikes in suicide rates sometimes follow a highly publicized suicide (Phillips et al., 1985, 1989). In the wake of screen idol Marilyn Monroe’s suicide on August 5, 1962, the number of suicides in the United States exceeded the usual August count by 200.

> “*When I see synchrony and mimicry—whether it concerns yawning, laughing, dancing, or aping—I see social connection and bonding.*”
>
> *Primatologist Frans de Waal, “The Empathy Instinct,” 2009*

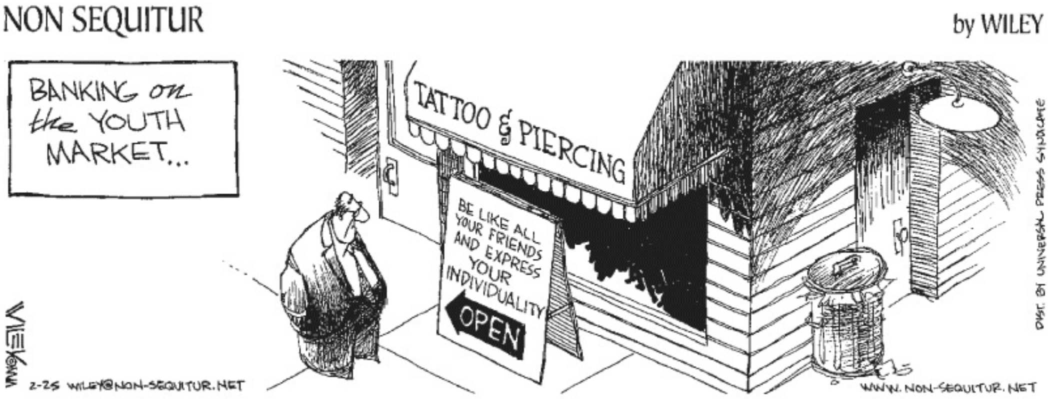
What causes behavior clusters? Do people act similarly because of their influence on one another? Or because they are simultaneously exposed to the same events and conditions? Seeking answers to such questions, social psychologists have conducted experiments on conformity.

Conformity and Social Norms

Suggestibility and mimicry are subtle types of **conformity**—adjusting our behavior or thinking toward some group standard. To study conformity, Solomon Asch (1955) devised a simple test. Imagine yourself as a participant in a supposed study of visual perception. You arrive in time to take a seat at a table with five other people. The experimenter asks the group to state, one by one, which of three comparison lines is identical to a standard line. You see clearly that the answer is Line 2, and you wait your turn to say so. Your boredom begins to show when the next set of lines proves equally easy.

conformity

adjusting our behavior or thinking to coincide with a group standard.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Now comes the third trial, and the correct answer seems just as clear-cut (**Figure 75.1**). But the first person gives what strikes you as a wrong answer: “Line 3.” When the second person and then the third and fourth give the same wrong answer, you sit up straight and squint. When the fifth person agrees with the first four, you feel your heart begin to pound. The experimenter then looks to you for your answer. Torn between the unanimity voiced by the five others and the evidence of your own eyes, you feel tense and suddenly unsure. You hesitate before answering, wondering whether you should suffer the discomfort of being the oddball. What answer do you give?

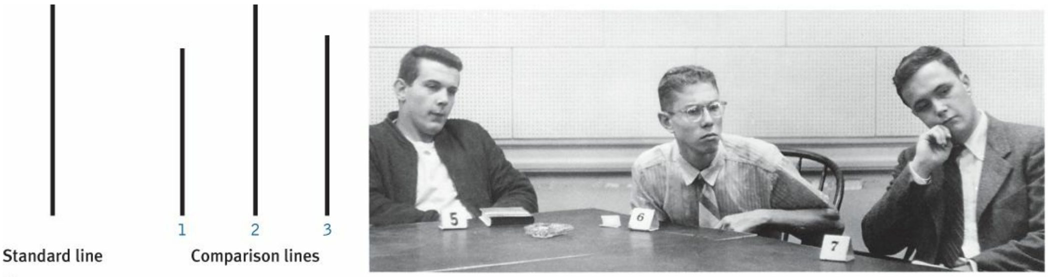
Standard line
1
2
3
Comparison lines
5
6
7

Figure 75.1
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Photo: William Vendivert/Scientific American

Figure 75.1 Asch’s conformity experiments

Which of the three comparison lines is equal to the standard line?

What do you suppose most people would say after hearing five others say, “Line 3”? In this photo from one of Asch’s experiments, the student in the center shows the severe discomfort that comes from disagreeing with the responses of other group members (in this case, accomplices of the experimenter).

Flip It Video: Normative Social Influence

In Asch’s experiments, college students, answering questions alone, erred less than 1 percent of the time. But what happened when several others—confederates—answered incorrectly? Although most people told the truth even when others did not, Asch was disturbed by his result: More than one-third of the time, these “intelligent and well-meaning” college students were “willing to call white black” by going along with the group.

Sanne Berg/Getty Images

Tattoos: Yesterday’s nonconformity, today’s conformity? As tattoos become perceived as fashion conformity, their popularity may wane.

Later investigations have not always found as much conformity as Asch found, but they have revealed that we are more likely to conform when we

- are made to feel incompetent or insecure.

- are in a group with at least three people.
- are in a group in which everyone else agrees. (If just one other person disagrees, the odds of our disagreeing greatly increase.)
- admire the group's status and attractiveness.
- have not made a prior commitment to any response.
- know that others in the group will observe our behavior.
- are from a culture that strongly encourages respect for social standards.

Why do we so often think as others think and do as they do? Why, when asked controversial questions, are college students' answers more similar when they raise their hands and more diverse when they use anonymous electronic clickers (Stowell et al., 2010)? Why do we clap when others clap, eat as others eat, believe what others believe, say what others say, even see what others see?

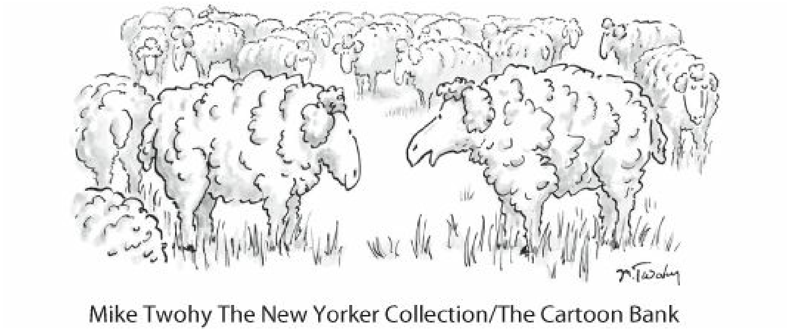
Frequently, we conform to avoid rejection or to gain social approval (Williams & Sommer, 1997). In such cases, we are responding to **normative social influence**. We are sensitive to social norms because the price we pay for being different can be severe. We need to belong. At other times, we conform because we want to be accurate. Groups provide information, and only an uncommonly stubborn person will never listen to others. When we accept others' opinions about reality, as when reading online movie and restaurant reviews, we are responding to **informational social influence**. As one female Welsh driver demonstrated in 2004, sometimes it pays to assume others are right and to follow their lead. She set a record for the longest distance driven on the wrong side of a British divided highway—30 miles, with only one minor sideswipe, before the motorway ran out and police were able to puncture her tires. The driver, who was intoxicated, later explained that she thought the hundreds of other drivers coming at her were all on the wrong side of the road (Woolcock, 2004).

normative social influence

influence resulting from a person's desire to gain approval or avoid disapproval.

informational social influence

influence resulting from one’s willingness to accept others’ opinions about reality.



Mike Twohy The New Yorker Collection/The Cartoon Bank

“I love the little ways you’re identical to everyone else.”

Is conformity bad or good? Conformity can be bad—leading people to agree with falsehoods or go along with bullying. Or it can be good—leading people to give more generously after observing others’ generosity (Nook et al., 2016). The answer also depends partly on our culturally influenced values. People in many Asian, African, and Latin American countries place a high value on collectivism (honoring group standards). Western Europeans and people in most English-speaking countries tend to prize individualism (giving priority to personal goals over group goals). Experiments across 17 countries have found lower conformity rates in individualist cultures (Bond & Smith, 1996). American university students, for example, tend to see themselves as less conforming than others (Pronin et al., 2007). We are, in our own eyes, individuals amid a crowd of sheep.

FYI

Like humans, migrating and herding animals conform for both informational and normative reasons (Claidière & Whiten, 2012). Following others is informative; compared with solo geese, a flock of geese migrates more accurately. (There is wisdom in the crowd.) And staying with the herd also sustains group membership.

Obedience: Following Orders

75-2 What do Milgram's obedience experiments teach us about the power of social influence?

Social psychologist Stanley Milgram (1963, 1974), a high school classmate of Philip Zimbardo and then a student of Solomon Asch, knew that people often give in to social pressures. But what about outright commands? Would they respond as did those who carried out Holocaust atrocities? (Some of Milgram's family members were Nazi concentration camp survivors.) To find out, he undertook what have become social psychology's most famous and controversial experiments (Benjamin & Simpson, 2009).

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Stanley Milgram (1933–1984) This social psychologist's obedience experiments "belong to the self-understanding of literate people in our age" (Sabini, 1986).

Imagine yourself as one of the nearly 1000 people who took part in Milgram's 20 experiments. You respond to an ad for participants in a Yale University psychology study of the effect of punishment on learning. Professor Milgram's assistant asks you and another person to draw slips from a hat to see who will be the "teacher" and who will be the "learner." You draw a "teacher" slip (unknown to you, both slips say "teacher"). The supposed learner, a mild and submissive-seeming man, is led to an adjoining room and strapped into a chair. From the chair, wires run through the wall to your machine. You sit down in front of a shock machine and are given your task: Teach and then test the learner on a list of word pairs. If the learner gives a wrong answer, you are to flip a switch to deliver a brief electric shock. For the first wrong answer, you will flip the switch labeled “15 Volts—Slight Shock.” With each succeeding error, you will move to the next higher voltage. With each flip of a switch, lights flash and electronic switches buzz.

The experiment begins, and you deliver the shocks after the first and second wrong answers. If you continue, you hear the learner grunt when you flick the third, fourth, and fifth switches. After you activate the eighth switch (“120 Volts—Moderate Shock”), the learner cries out that the shocks are painful. After the tenth switch (“150 Volts—Strong Shock”), he begins shouting. “Get me out of here! I won’t be in the experiment anymore! I refuse to go on!” You draw back, but the stern experimenter prods you: “Please continue—the experiment requires that you continue.” You resist, but the experimenter insists, “It is absolutely essential that you continue,” or “You have no other choice, you *must* go on.”

If you obey, you hear the learner shriek in apparent agony as you continue to raise the shock level after each new error. After the 330-volt level, the learner refuses to answer and falls silent. Still, the experimenter pushes you toward the final, 450-volt switch. “Ask the question,” he says, “and if no correct answer is given, administer the next shock level.”

Would you follow the experimenter’s commands to shock someone? At what level would you refuse to obey? Before undertaking the experiments, Milgram asked nonparticipants what they would do. Most were sure they would stop soon after the learner first indicated pain, certainly before he shrieked in agony. Forty psychiatrists agreed with that prediction. Were the predictions accurate? Not even close. When Milgram conducted the experiment with other men aged 20 to 50, he was astonished. More than 60 percent complied fully—right up to the last switch. When he ran a new study, with 40 new “teachers” and a learner who complained of a “slight heart condition,” the results were similar. A full 65 percent of the new teachers obeyed the experimenter, right up to 450 volts (**Figure 75.2**). In 10 later studies, women obeyed at rates similar to men’s (Blass, 1999).

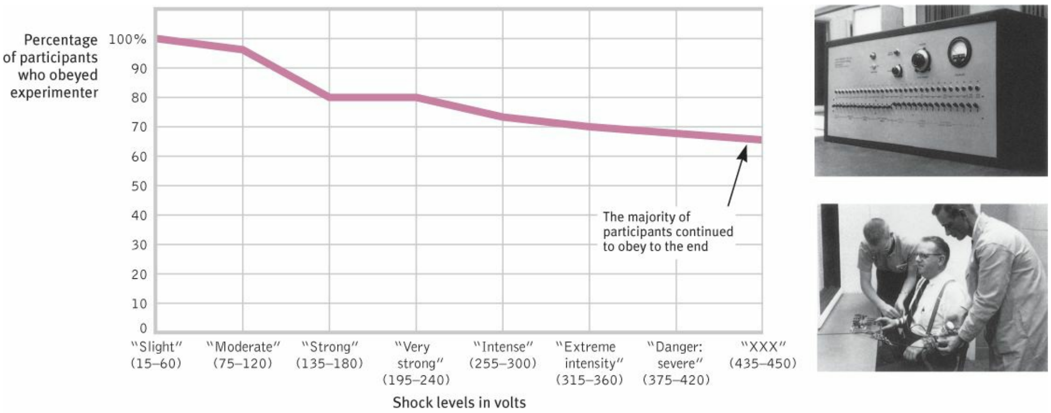

Figure 75.2
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Photos: Stanley Milgram, from the film “Obedience.” Rights held by Alexandra Milgram
Data from Golder & Macy, 2011.

Figure 75.2 Milgram’s follow-up obedience experiment

In a repeat of the earlier experiment, 65 percent of the adult male “teachers” fully obeyed the experimenter’s commands to continue. They did so despite the “learner’s” earlier mention of a heart condition and despite hearing cries of protest after they administered what they thought were 150 volts and agonized protests after 330 volts.

Were Milgram’s results a product of the 1960s American mindset? *No.* When one researcher substantially repeated Milgram’s basic experiment, 70 percent of the participants complied up to the 150-volt point—only a slight reduction from Milgram’s 83 percent at that level (Burger, 2009). A Polish research team found 90 percent compliance to the same level (Dolin´ski et al., 2017). When a French reality TV show replicated Milgram’s study, 81 percent of the teachers, egged on by a cheering audience, obeyed and tortured a screaming victim (Beauvois et al., 2012).

Did Milgram’s teachers figure out the hoax—that no real shock was being delivered and the learner was in fact a confederate pretending to feel pain? Did they realize the experiment was really testing their willingness to comply with commands to inflict punishment? *No.* The teachers typically displayed genuine distress: They perspired, trembled, laughed nervously, and bit their lips.

Milgram's use of deception and stress triggered a debate over his research ethics. In his own defense, Milgram pointed out that, after the participants learned of the deception and actual research purposes, virtually none regretted taking part (though perhaps by then the participants had reduced their cognitive dissonance—the discomfort they felt when their actions conflicted with their attitudes). When 40 of the teachers who had agonized most were later interviewed by a psychiatrist, none appeared to be suffering emotional aftereffects. All in all, said Milgram, the experiments provoked less enduring stress than university students experience when facing and failing big exams (Blass, 1996). Other scholars, however, after delving into Milgram's archives, report that his debriefing was less extensive and his participants' distress greater than he had suggested (Nicholson, 2011; Perry, 2013). Critics have also speculated that participants may have been identifying with the researcher and his scientific goals rather than being blindly obedient (Haslam et al., 2014, 2016).

In later experiments, Milgram discovered some conditions that influence people's behavior. When he varied the situation, full obedience ranged from 0 to 93 percent. Obedience was highest when

- *the person giving the orders was close at hand and was perceived to be a legitimate authority figure.* Such was the case in 2005 when Temple University's basketball coach sent a 250-pound bench player, Nehemiah Ingram, into a game with instructions to commit "hard fouls." Following orders, Ingram fouled out in four minutes after breaking an opposing player's right arm.
- *the authority figure was supported by a powerful or prestigious institution.* Compliance was somewhat lower when Milgram dissociated his experiments from Yale University. People have wondered: Why, during the 1994 Rwandan Genocide, did so many Hutu citizens slaughter their Tutsi neighbors? It was partly because they were part of

"a culture in which orders from above, even if evil," were understood as having the force of law (Kamatali, 2014).

- *the victim was depersonalized or at a distance, even in another room.* Similarly, many soldiers in combat either have not fired their rifles at an enemy they could see, or have not aimed them properly. Such refusals to kill are rarer among soldiers operating long-distance artillery or aircraft weapons (Padgett, 1989). Those who kill from a distance—by operating remotely piloted drones—also suffer much less posttraumatic stress than do veterans of on-the-ground conflict (Miller, 2012).
- *there were no role models for defiance*. "Teachers" did not see any other participant disobey the experimenter.

AP® EXAM TIP

Three of the most famous research projects in psychology were done by social psychologists, and you've now read about them all. Be able to identify the major contributions of Zimbardo (from Module 74), Asch, and Milgram.

The power of legitimate, close-at-hand authorities was apparent among those who followed orders to carry out the Nazis' Holocaust atrocities. Obedience alone does not explain the Holocaust—anti-Semitic ideology produced eager killers as well (Fenigstein, 2015; Mastroianni, 2015). But obedience was a factor. In the summer of 1942, nearly 500 middle-aged German reserve police officers were dispatched to German-occupied Jozefow, Poland. On July 13, the group's visibly upset commander informed his recruits, mostly family men, of their orders. They were to round up the village's Jews, who were said to be aiding the enemy. Able-bodied men would be sent to work camps, and the rest would be shot on the spot.

Jeff Widener/AP Photo

Standing up for democracy Some individuals—roughly one in three in Milgram’s experiments—resist social coercion, as did this unarmed man in Beijing, by single-handedly challenging an advancing line of tanks the day after the 1989 Tiananmen Square student uprising was suppressed.

The commander gave the recruits a chance to refuse to participate in the executions. Only about a dozen immediately refused. Within 17 hours, the remaining 485 officers killed 1500 helpless women, children, and elderly, shooting them in the back of the head as they lay face down. Hearing the victims’ pleas, and seeing the gruesome results, some 20 percent of the officers did eventually dissent, managing either to miss their victims or to slip away and hide until the slaughter was over (Browning, 1992). In real life, as in Milgram’s experiments, those who resisted usually did so early, and they were the minority.

A different story played out in the French village of Le Chambon. There, villagers openly defied orders to cooperate with the “New Order”: They sheltered French Jews destined for deportation to Germany, and they sometimes helped them escape across the Swiss border. The villagers’ Protestant ancestors had themselves been persecuted, and their pastors taught them to “resist whenever our adversaries will demand of us obedience contrary to the orders of the Gospel” (Rochat, 1993). Ordered by police to give a list of sheltered Jews, the head pastor modeled defiance: “I don’t know of Jews, I only know of human beings.” At great personal risk, the people of Le Chambon made an initial commitment to resist. Throughout the long and terrible war, they suffered poverty and were punished for their disobedience. Still, supported by their beliefs, their role models, their interactions with one another, and their own initial acts, they remained defiant to the war’s end.

Lest we presume that obedience is always evil and resistance is always good, consider the heroic obedience of British soldiers who, in 1852, were traveling with civilians aboard the steamship *Birkenhead.* As they neared their South African port, the *Birkenhead* became impaled on a rock. To calm the passengers and permit an orderly exit of civilians on the three available lifeboats, soldiers who were not assisting the passengers or working the pumps lined up at parade rest. “Steady, men!” said their officer as the lifeboats pulled away. Heroically, no one frantically rushed to claim a lifeboat seat. As the boat sank, all were plunged into the sea, most to be drowned or devoured by sharks. For almost a century, noted James Michener (1978), “the Birkenhead drill remained the measure by which heroic behavior at sea was measured.”

Lessons From the Conformity and Obedience Studies

75-3 What do the social influence studies teach us about ourselves? How much power do we have as individuals?

How do the laboratory experiments on social influence relate to everyday life? How does judging the length of a line or flicking a shock switch relate to everyday social behavior? Recall from Module 6 that psychology’s experiments aim not to re-create the literal behaviors of everyday life but to capture and explore the underlying processes that shape those behaviors. Solomon Asch and Stanley Milgram devised experiments that forced a familiar choice: Do I adhere to my own standards, even when they conflict with the expectations of others?

In Milgram’s experiments and their modern replications, participants were torn. Should they respond to the pleas of the victim or the orders of the experimenter? Their moral sense warned them not to harm another, yet it also prompted them to obey the experimenter and to be a good research participant. With kindness and obedience on a collision course, obedience usually won.

> “*I was only following orders.*”
>
> *Adolf Eichmann, director of Nazi deportation of Jews to concentration camps*

These experiments demonstrated that strong social influences induce many people to conform to falsehoods or capitulate to cruelty. Milgram saw this as the fundamental lesson of this work: “Ordinary people, simply doing their jobs, and without any particular hostility on their part, can become agents in a terrible destructive process” (1974, p. 6).

Focusing on the end point—450 volts, or someone’s real-life violence—we can hardly comprehend the inhumanity. But Milgram did not entrap his teachers by asking them first to zap learners with enough electricity to make their hair stand on end. Using the foot-in-the-door technique, he instead began with a little tickle of electricity and escalated step by step. In the minds of those throwing the switches, the small action became justified, making the next act tolerable. So it happens when people succumb, gradually, to evil.

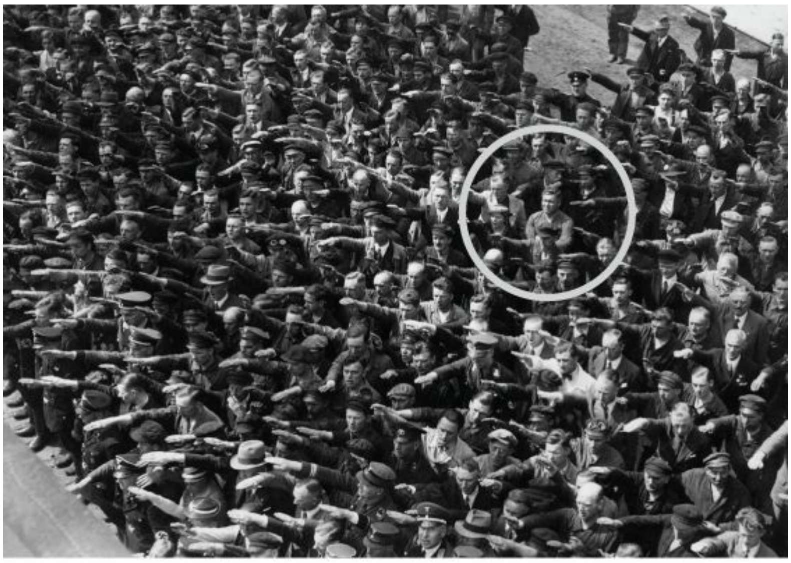
> “*All evil begins with 15 volts.*”
>
> *Philip Zimbardo, Stanford lecture, 2010*

In any society, great evils often grow out of people’s compliance with lesser evils. The Nazi leaders suspected that most German civil servants would resist shooting or gassing Jews directly, but they found them surprisingly willing to handle the paperwork of the Holocaust (Silver & Geller, 1978). Milgram found a similar reaction in his experiments. When he asked 40 men to administer the learning test while someone else did the shocking, 93 percent complied. Cruelty does not require devilish villains. All it takes is ordinary people corrupted by an evil situation. Ordinary students may follow orders to haze initiates into their group. Ordinary employees may follow orders to produce and market harmful products. Ordinary soldiers may follow orders to punish and then torture prisoners (Lankford, 2009).

In Jozefow and Le Chambon, as in Milgram’s experiments, those who resisted usually did so early. After the first acts of compliance or resistance, attitudes began to follow and justify behavior.

What have social psychologists learned about the power of the individual? *Social control* (the power of the situation) and *personal control* (the power of the individual) interact. Much as water dissolves salt but not sand, so rotten situations turn some people into bad apples while others resist (Johnson, 2007).

Some people do resist. When feeling pressured, some react by doing the opposite of what is expected (Brehm & Brehm, 1981). The power of one or two individuals to sway majorities is *minority influence* (Moscovici, 1985). In studies, one finding repeatedly stands out. When you are the minority, you are far more likely to sway the majority if you hold firmly to your position and don’t waffle. This tactic won’t make you popular, but it may make you influential, especially if your self-confidence stimulates others to consider why you react as you do. Even when a minority’s influence is not yet visible, people may privately develop sympathy for the minority position and rethink their views (Wood et al., 1994).



Sueddeutsche Zeitung Photo/Alamy

A minority of one To be August Landmesser, standing defiantly with arms folded as everyone else salutes their allegiance to the Nazi Party and Adolph Hitler, requires extraordinary courage. But sometimes such individuals have inspired others, demonstrating the power of minority influence.

> “*If evil is contagious, so is goodness.*”
>
> *Tweet from Pope Francis, 2017*

The powers of social influence are enormous, but so are the powers of the committed individual. Were this not so, communism would have remained an obscure theory, Christianity would be a small Middle Eastern sect, and Rosa Parks’ refusal to sit at the back of the bus would not have ignited the U.S. civil rights movement. Social forces matter. But individuals matter, too.

Check Your Understanding

Ask Yourself

- How have you found yourself conforming, or perhaps “conforming to nonconformity”? In what ways have you seen others identifying themselves with those of the same culture or subculture?

Test Yourself

- Despite her mother’s pleas to use a more ergonomic backpack, Antonia insists on trying to carry all of her books to school in an oversized purse the way her fashionable friends all seem to do. Antonia is affected by what type of social influence?
- Psychology’s most famous obedience experiments, in which most participants obeyed an authority figure’s demands to inflict presumed painful, dangerous shocks on an innocent participant, were conducted by social psychologist _______________ _______________.
- What types of situations have researchers found to be most likely to encourage obedience in participants?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 75 REVIEW

75-1 What is *social contagion*, and how do conformity experiments reveal the power of social influence?

- Social contagion (the chameleon effect), our tendency to unconsciously imitate others’ behavior, expressions, postures, inflections, and moods, is a form of *conformity*. Social networks serve as contagious pathways for moods, both good and bad.
- Solomon Asch and others have found that we are most likely to adjust our behavior or thinking to coincide with a group standard when (a) we feel incompetent or insecure, (b) our group has at least three people, (c) everyone else agrees, (d) we admire the group’s status and attractiveness, (e) we have not already committed to another response, (f) we know we are being observed, and (g) our culture encourages respect for social standards.
- We may conform to gain approval *(normative social influence)* or because we are willing to accept others’ opinions as new information *(informational social influence)*.

75-2 What do Milgram’s obedience experiments teach us about the power of social influence?

- Stanley Milgram’s experiments—in which people obeyed orders even when they thought they were harming another person—demonstrated that strong social influences can make ordinary people conform to falsehoods or give in to cruelty.
- Obedience was highest when (a) the person giving orders was nearby and was perceived as a legitimate authority figure, (b) the research was supported by a prestigious institution, (c) the victim was depersonalized or at a distance, and (d) there were no role models for defiance.

75-3 What do the social influence studies teach us about ourselves? How much power do we have as individuals?

- These experiments have demonstrated that strong social influences can make people conform to falsehoods or capitulate to cruelty. The power of the individual (personal control) and the power of the situation (social control) interact.
- A small minority that consistently expresses its views may sway the majority, as may even a single committed individual.

Multiple-Choice Questions

1. Which of the following is an example of conformity?

a. Malik has had a series of dogs over the years. Each has learned to curl up at his feet when he watches television.

b. Renee buys the same brand of sweatshirt that most of the kids in her school are wearing.

c. Jonah makes sure to arrive home before his curfew because he knows he will be grounded if he doesn't.

d. Yuri makes sure to arrive home before her curfew because she does not want her parents to be disappointed in her.

e. Terry cranks it up a notch during volleyball practice because the team captain has been on her case for not showing enough effort.

2. Jon does what his friends are doing and throws eggs at houses on Halloween, even though he knows that he should not. Jon's egg throwing is most likely due to

a. obedience.

b. normative social influence.

c. social contagion.

d. informational social influence.

e. the chameleon effect.

3. In Milgram's classic study on obedience, approximately what percentage of people delivered what they believed to be the maximum shock level?

a. One-tenth
b. One-half
c. One-third
d. One-fourth
e. Two-thirds

4. In Milgram’s studies, obedience to authority was highest when

a. the person receiving orders witnessed others defying the authority figure.
b. the person receiving orders wondered whether the person giving orders had legitimate authority.
c. the person supposedly receiving the shocks was physically near the person receiving orders.
d. the authority figure was from a prestigious institution.
e. the person receiving the orders was female.

Practice FRQs

1. Pedro’s high school has a dress code that prohibits the wearing of hoods, such as with sweatshirts or jackets. The principal stands in the hallway and tells kids wearing their hoods up to take them down. Most students, including Pedro, comply. One day, Pedro sees a group of older boys he admires sneak past the principal with their hoods up, and Pedro does the same. Explain the terms *obedience* and *conformity* in this scenario.

Answer

1 point: Obedience is following the orders of an authority figure. When Pedro does what he is told by the principal and puts his hood down, he is demonstrating obedience. ↩ Page 778

1 point: Conformity is adjusting our behavior or thinking to coincide with a group standard. When Pedro leaves his hood up, he is conforming to the standard set by the older boys. Page 776

2. Explain two specific reasons why Milgram’s study would not pass the ethical guidelines of an institutional review board today. (See Module 7 if you need a reminder.)

(2 points)

Module **76 Group Behavior**

Flip It Video: Social Facilitation and Social Loafing

LEARNING TARGETS

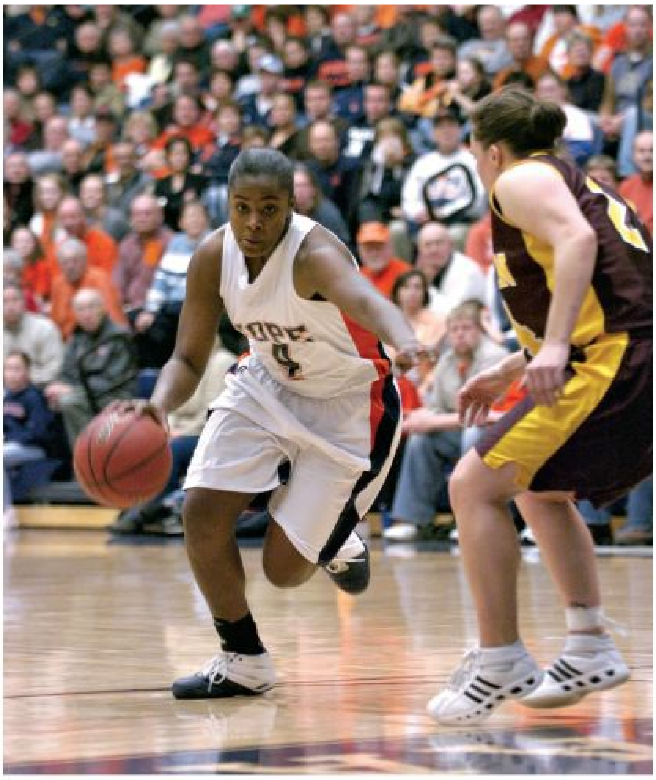
- 76-1 Describe how the presence of others influences our actions via social facilitation, social loafing, and deindividuation.
- 76-2 Explain how group interaction can enable group polarization.
- 76-3 Discuss the role the Internet plays in group polarization.
- 76-4 Discuss how group interaction can enable groupthink.
- 76-5 Describe how culture affects our behavior.

76-1 How does the presence of others influence our actions via social facilitation, social loafing, and deindividuation?

Imagine standing in a room holding a fishing pole. Your task is to wind the reel as fast as you can. On some occasions you wind in the presence of another participant, who is also winding as fast as possible. Will the other's presence affect your own performance?

In one of social psychology's first experiments, Norman Triplett (1898) reported that adolescents would wind a fishing reel faster in the presence of someone doing the same thing. Although a modern reanalysis revealed that the difference was modest (Stroebe, 2012), Triplett inspired later social psychologists to study how others' presence affects our behavior. Group influences operate both in simple groups—one person in the presence of another—and in more complex groups.

Social Facilitation


Hope College

Social facilitation Skilled athletes often find they are “on” before an audience. What they do well, they do even better when people are watching.

Triplett’s claim—of strengthened performance in others’ presence—is called **social facilitation**. But further studies revealed that the truth is more complicated: The presence of others strengthens our most *likely* response —the correct one on an easy task, an incorrect one on a difficult task (Guerin, 1986; Zajonc, 1965). Why? Because when others observe us, we become aroused, and this arousal amplifies our reactions. Thus, expert pool players who made 71 percent of their shots when alone made 80 percent when four people came to watch them (Michaels et al., 1982). Poor shooters, who made 36 percent of their shots when alone, made only 25 percent when watched.

social facilitation

improved performance on simple or well-learned tasks in the presence of others.

AP® EXAM TIP

As you work through this material, identify examples of group behavior in your own life. Then, compare your examples with a classmate's. This is a great way to make psychology come alive and to study effectively. If you apply these terms while reading the unit, it will be easier to identify the vocabulary later.

The energizing effect of an enthusiastic audience helps explain the home-team advantage that has shown up in studies of more than a quarter-million college and professional athletic events in various countries (Allen & Jones, 2014; Jamieson, 2010). Home teams win about 6 in 10 games, with the home advantage being greatest for teamwork-centered sports, such as soccer and basketball (Jones, 2015). For most sports, home cooking is best (see **Table 76.1**).

TABLE 76.1 Home Advantage in Team Sports

Sport	Years	Percentage of home games won
Nippon League Baseball	1998–2009	53.6
Major League Baseball	1903–2009	53.9
National Hockey League	1917–2009	55.7
International Rugby	1871–2009	56.9
National Football League	1966–2009	57.3
International Cricket	1877–	57.4

	2009	
National Basketball Association	1946–2009	60.5
Women’s National Basketball Association	2003-2009	61.7
English Premier League Soccer	1993–2009	63.0
NCAA Men’s Basketball	1947–2009	68.8
Major League Soccer	2002–2009	69.1

Data from Moskowitz & Wertheim, 2011.

The point to remember: What you do well, you are likely to do even better in front of an audience, especially a friendly audience. What you normally find difficult may seem all but impossible when you are being watched.

Social facilitation also helps explain a funny effect of crowding. Comedians know that a “good house” is a full one. What they may not know is that crowding triggers arousal. Comedy routines that are mildly amusing in an uncrowded room seem funnier in a densely packed room (Aiello et al., 1983; Freedman & Perlick, 1979). When seated close to one another, people like a friendly person even more and an unfriendly person even less (Schiffenbauer & Schiavo, 1976; Storms & Thomas, 1977). So, to increase the chances of a lively interaction at your next event, choose a room or set up seating that will just barely accommodate everyone.

Social Loafing

Social facilitation experiments test the effect of others’ presence on the performance of an individual task, such as shooting pool. But what happens when people perform as a group—say, in a team tug-of-war? Would you exert more, less, or the same effort as in a one-on-one match?

To find out, a University of Massachusetts research team asked blindfolded students “to pull as hard as you can” on a rope. When they fooled the students into believing three others were also pulling behind them, students exerted only 82 percent as much effort as when they knew they were pulling alone (Ingham et al., 1974). And consider what happened when blindfolded people seated in a group clapped or shouted as loudly as they could while hearing (through headphones) other people clapping or shouting loudly (Latané, 1981). When they thought they were part of a group effort, the participants produced about one-third less noise than when clapping or shouting “alone.”

This diminished effort is called **social loafing** (Jackson & Williams, 1988; Latané, 1981). Experiments in the United States, India, Thailand, Japan, China, and Taiwan have found social loafing on various tasks, though it was especially common among men in individualist cultures (Karau & Williams, 1993). What causes social loafing? When people act as part of a group, they may

- feel *less accountable* and therefore worry less about what others think.
- view their individual contributions as *dispensable* (Harkins & Szymanski, 1989; Kerr & Bruun, 1983).
- *overestimate* their own contributions, downplaying others’ actions (Schroeder et al., 2016).
- slack off (as you perhaps have observed on group assignments) if they share equally in the benefits, regardless of how much they contribute. Unless highly motivated and strongly identified with the group, people may *free ride* on others’ efforts.

social loafing

the tendency for people in a group to exert less effort when pooling their efforts toward attaining a common goal than when individually accountable.

Adie Bush/Getty Images

Working hard, or hardly working? In group projects, social loafing often occurs, as individuals free ride on the efforts of others.

Deindividuation

Lewis Whyld/ PA Wire/AP Images

Deindividuation During England’s 2011 riots and looting, rioters were disinhibited by social arousal and by the anonymity provided by darkness and their hoods and masks. Later, some of those arrested expressed bewilderment over their own behavior.

We’ve seen that the presence of others can arouse people (social facilitation), or it can diminish their feelings of responsibility (social loafing). But sometimes the presence of others does both. The uninhibited behavior that results can range from a food fight to vandalism or rioting. Perhaps you can recall following the crowd in yelling at a referee or opposing team? This process of losing self-awareness and self-restraint, called **deindividuation**, often occurs when group participation makes people both *aroused* and *anonymous*. Compared with identifiable women in a control group, New York University women dressed in depersonalizing Ku Klux Klan–style hoods delivered twice as much presumed electric shock to a victim (Zimbardo, 1970).

deindividuation

the loss of self-awareness and self-restraint occurring in group situations that foster arousal and anonymity.

Deindividuation thrives, for better or for worse, in many settings. The anonymity of online discussion boards and blog comment sections can unleash mocking or cruel words. Online bullies, who would never say “You’re the ugliest person I know” to someone’s face, will hide behind their anonymity. Tribal warriors who depersonalize themselves with face paints or masks are more likely than those with exposed faces to kill, torture, or mutilate captured enemies (Watson, 1973). When we shed self-awareness and self-restraint—whether in a mob, at a rock concert, at a ballgame, or at worship—we become more responsive to the group experience—bad or good. For a comparison of social facilitation, social loafing, and deindividuation, see **Table 76.2**.

TABLE 76.2 Behavior in the Presence of Others: Three Phenomena

Phenomenon	**Social context**	**Psychological effect of others’ presence**	**Behavioral effect**
Social facilitation	Individual being observed	Increased arousal	Amplified dominant behavior, such as doing better what one does well (or doing worse what is difficult)
Social loafing	Group projects	Diminished feelings of responsibility when not individually accountable	Decreased effort
Deindividuation	Group setting that fosters arousal and anonymity	Reduced self-awareness	Lowered self-restraint

✓ Check Your Understanding

Ask Yourself

- How have you experienced social loafing, such as with group projects?

Test Yourself

- What is social facilitation, and why is it more likely to occur with a well-learned task?
- People tend to exert less effort when working with a group than they would alone, which is called _______________ _______________.
- You are organizing a meeting of fiercely competitive political candidates. To add to the fun, friends have suggested handing out masks of the candidates' faces for supporters to wear. What phenomenon might these masks engage?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

* * *

We have examined the conditions under which the *presence* of others can motivate people to exert themselves or tempt them to free ride on the efforts of others, make easy tasks easier and difficult tasks harder, and enhance humor or fuel mob violence. Research also shows that *interacting* with others can similarly have both bad and good effects.

Group Polarization

76-2 How can group interaction enable group polarization?

We live in an increasingly polarized world. The Middle East is torn by warring factions. The European Union is struggling with nationalist divisions. In 1990, a one-minute speech in the U.S. Congress would enable you to guess the speaker’s party just 55 percent of the time; by 2009, partisanship was evident 83 percent of the time (Gentzkow et al., 2016). In 2016, for the first time in survey history, most U.S. Republicans and Democrats reported having “*very* unfavorable” views of the other party (Doherty & Kiley, 2016). And a record 77 percent of Americans perceived their nation as divided (Jones, 2016).

A powerful principle helps us understand our increasingly polarized world: The beliefs and attitudes we bring to a group grow stronger as we discuss them with like-minded others. This process, called **group polarization**, can have beneficial results, as when low-prejudice students become even more accepting while discussing racial issues. And it can be socially toxic, as when high-prejudice students who discuss racial issues become more prejudiced (Myers & Bishop, 1970; **Figure 76.1**). The repeated finding: Like minds polarize.

group polarization

the enhancement of a group’s prevailing inclinations through discussion within the group.

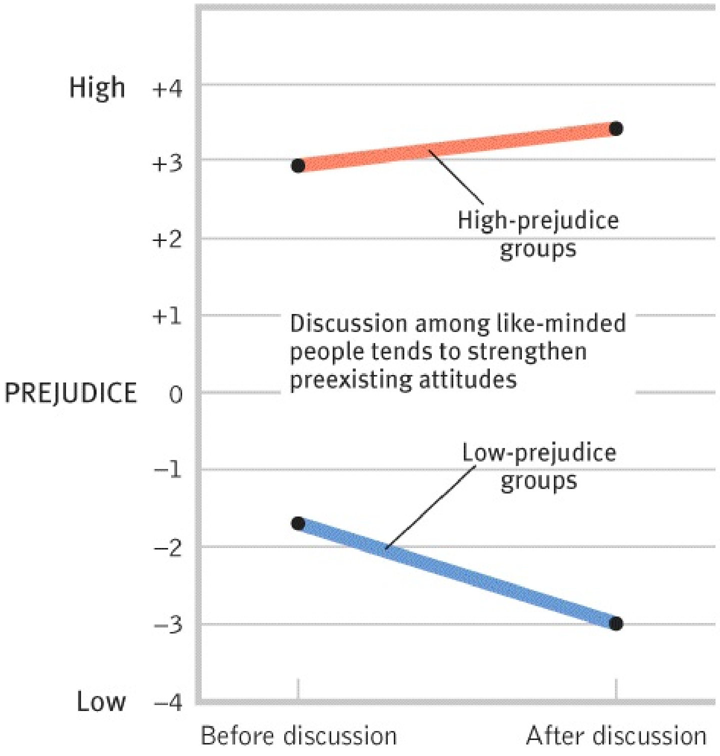


Figure 76.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Myers & Bishop, 1970.

Figure 76.1 Group polarization

If a group is like-minded, discussion strengthens its prevailing opinions. Talking over racial issues increased prejudice in a high-prejudice group of high school students and decreased it in a low-prejudice group.

Analyses of terrorist organizations reveal that the terrorist mentality emerges slowly among people who share a grievance (McCauley, 2002; McCauley & Segal, 1987; Merari, 2002). As they interact in isolation (sometimes with other "brothers" and "sisters" in camps or in prisons), their views grow more and more extreme. Increasingly, they categorize the world as "us" against "them" (Chulov, 2014; Moghaddam, 2005). Knowing that group polarization occurs when like-minded people segregate, a 2006 U.S. National Intelligence estimate speculated that "the operational threat from self-radicalized cells will grow."

> “ *What explains the rise of fascism in the 1930s? The emergence of student*

> *radicalism in the 1960s? The growth of Islamic terrorism in the 1990s? . . . The unifying theme is simple:* When people find themselves in groups of like-minded types, they are especially likely to move to extremes. *[This] is the phenomenon of* group polarization.”
>
> *Cass Sunstein (2009)*

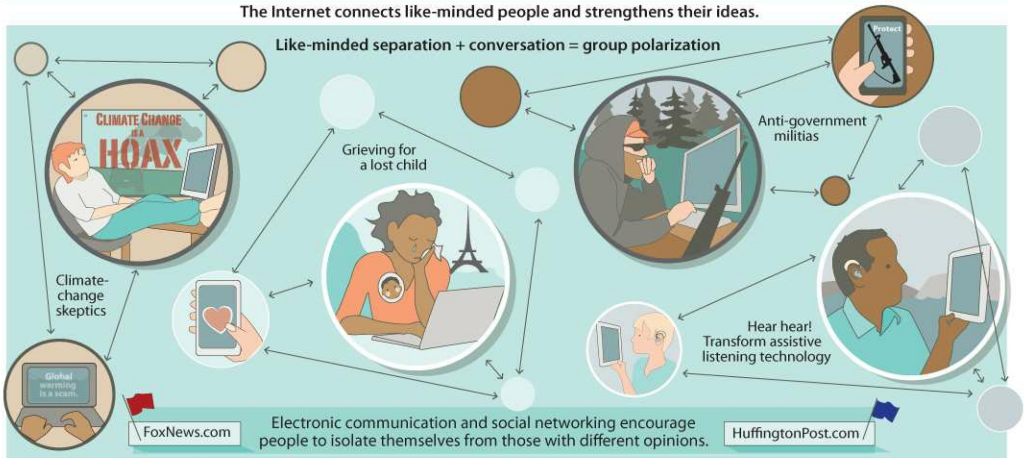
The Internet offers us a connected global world, yet also provides an easily accessible medium for group polarization. When I [DM] got my start in social psychology with experiments on group polarization, I never imagined the potential dangers, or the creative possibilities, of polarization in *virtual* groups. On the plus side, I can network with other advocates of accessibility for people with hearing loss. On the minus side, the Internet enables opinion bubbles: Progressives friend progressives and share links to sites that affirm their shared views. Conservatives connect with conservatives and likewise share conservative perspectives. With news feeds and retweets, we feed one another information—and misinformation—and click on content we agree with (Bakshy et al., 2015; Barberá et al., 2015). Thus, within the Internet’s echo chamber of the like-minded, views become more extreme. Suspicion becomes conviction. Disagreements with the other tribe can escalate to demonization. (For more on the Internet’s role in group polarization—toward ends that are good as well as bad—see Thinking Critically About: The Internet as Social Amplifier.)

> “*Dear Satan, thank you for having my Internet news feeds tailored especially for ME!*”
>
> *Comedian Steve Martin, 2016 tweet*

76-3 What role does the Internet play in group polarization?

Thinking Critically About:
The Internet as Social Amplifier

The Internet connects like-minded people and strengthens their ideas.


Like-minded separation + conversation = group polarization
CLIMATE CHANGE IS A HOAX
Climate-change skeptics
Global warming is a scam.
Grieving for a lost child
Protect
Anti-government militias
Hear hear! Transform assistive listening technology
FoxNews.com
HuffingtonPost.com

Electronic communication and social networking encourage people to isolate themselves from those with different opinions.

On Facebook and Twitter, we often share political content with like-minded others.[1]

White supremacists become more racist. Bullies become more abusive. And militia members become more violence-prone.

People find support online for their shared ideas and suspicions.

Peacemakers grow stronger in their convictions. Cancer survivors and bereaved parents strengthen shared perspectives of resilience. Social justice promoters become more committed.

1. Bakshy et al., 2015; Barberá et. al., 2015.

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Groupthink

76-4 How can group interaction enable groupthink?

Does group influence ever distort important national decisions? Consider the Bay of Pigs fiasco. In 1961, U.S. President John F. Kennedy and his advisers decided to invade Cuba with 1400 CIA-trained Cuban exiles. When the invaders were easily captured and quickly linked to the U.S. government, Kennedy wondered aloud, “How could I have been so stupid?”

> “*One of the dangers in the White House, based on my reading of history, is that you get wrapped up in groupthink and everybody agrees with everything, and there’s no discussion and there are no dissenting views.*”
>
> *Barack Obama, December 1, 2008, press conference*

Social psychologist Irving Janis (1982) studied the decision-making process leading to the ill-fated invasion. He discovered that the soaring morale of the recently elected president and his advisers fostered undue confidence. To preserve the good feeling, group members suppressed or self-censored their dissenting views, especially after President Kennedy voiced his enthusiasm for the scheme. Since no one spoke strongly against the idea, everyone assumed the support was unanimous. To describe this harmonious but unrealistic group thinking, Janis coined the term **groupthink**.

groupthink
the mode of thinking that occurs when the desire for harmony in a decision-making group overrides a realistic appraisal of alternatives.

Later studies showed that groupthink—fed by overconfidence, conformity, self-justification, and group polarization—contributed to other fiascos as well. Among them were the failure to anticipate the 1941 Japanese attack on Pearl Harbor; the escalation of the Vietnam war; the U.S. Watergate cover-up; the Chernobyl nuclear reactor accident (Reason, 1987); the U.S. space shuttle *Challenger* explosion (Esser & Lindoerfer, 1989); and the Iraq war, launched on the false idea that Iraq had weapons of mass destruction (U.S. Senate Intelligence Committee, 2004).

Despite the dangers of groupthink, two heads are often better than one. Knowing this, Janis also studied instances in which U.S. presidents and their advisers collectively made good decisions, such as when the Truman administration formulated the Marshall Plan, which offered assistance to Europe after World War II, and when the Kennedy administration successfully prevented the Soviets from installing missiles in Cuba. His conclusion? Groupthink is prevented when a leader—whether in government or in business—welcomes various opinions, invites experts' critiques of developing plans, and assigns people to identify possible problems. Just as the suppression of dissent bends a group toward bad decisions, open debate often shapes good ones. This is especially the case with diverse groups, whose varied perspectives often enable creative or superior outcomes (Nemeth & Ormiston, 2007; Page, 2007). Teams of smart people tend to surpass individual smart people at predicting political events (Mellers et al., 2015). None of us is as smart as all of us.

> “*If you have an apple and I have an apple and we exchange apples then you and I will still each have one apple. But if you have an idea and I have an idea and we exchange these ideas, then each of us will have two ideas.*”
>
> *Attributed to dramatist George Bernard Shaw, 1856–1950*

Cultural Influences

76-5 How does culture affect our behavior?

Compared with the narrow path taken by flies, fish, and foxes, the road along which environment drives us is wider. The mark of our species—nature’s great gift to us—is our ability to learn and adapt. We come equipped with a huge cerebral hard drive ready to receive cultural software.

Culture is the behaviors, ideas, attitudes, values, and traditions shared by a group of people and transmitted from one generation to the next (Brislin, 1988; Cohen, 2009). Human nature, noted Roy Baumeister (2005), seems designed for culture. We are social animals, but more. Wolves are social animals; they live and hunt in packs. Ants are incessantly social, never alone. But “culture is a better way of being social,” observed Baumeister. Wolves function pretty much as they did 10,000 years ago. We enjoy countless things that were unknown to our century-ago ancestors. Culture works.

culture

the enduring behaviors, ideas, attitudes, values, and traditions shared by a group of people and transmitted from one generation to the next.

Other animals exhibit smaller kernels of culture. Chimpanzees sometimes invent customs—using leaves to clean their bodies, slapping branches to get attention, and doing a “rain dance” by slowly displaying themselves at the start of rain—and pass them on to their peers and offspring (Whiten et al., 1999). Culture supports survival and reproduction by transmitting learned behaviors that give a group an edge. But human culture does more.

Thanks to our culture’s mastery of language, we humans enjoy the *preservation of innovation.* Within the span of this day, we have used

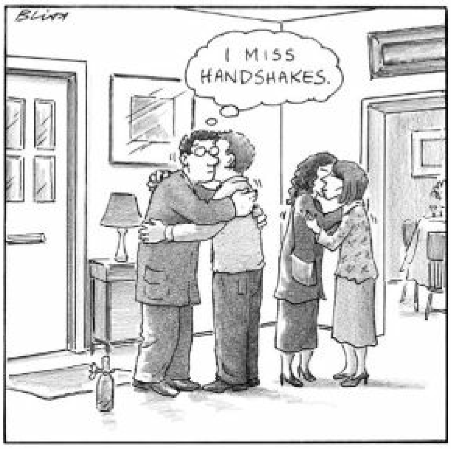
Google, smart phones, digital hearing technology [DM], and a GPS running watch [ND]. On a grander scale, we have culture's accumulated knowledge to thank for the last century's 30-year extension of the average human life expectancy in many countries. Moreover, culture enables an efficient *division of labor*. Although two lucky people get their name on this book (which transmits accumulated cultural wisdom), the product actually results from the coordination and commitment of a team of gifted people, no one of whom could produce it alone.

Across cultures, we differ. But beneath differences is our great similarity—our capacity for culture. Culture transmits the customs and beliefs that enable us to communicate, to exchange money for things, to play, to eat, and to drive with agreed-upon rules and without crashing into one another.

Variation Across Cultures

We see our adaptability in cultural variations among our beliefs and our values, in how we nurture our children and bury our dead, and in what we wear (or whether we wear anything at all). We are ever mindful that the worldwide readers of this book are culturally diverse. You and your ancestors reach from Asia to Africa.

Riding along with a unified culture is like biking with the wind: As it carries us along, we hardly notice it is there. When we try biking *against* the wind we feel its force. Face-to-face with a different culture, we become aware of the cultural winds. Visiting Europe, most North Americans notice the smaller cars, the left-handed use of the fork, the uninhibited attire on the beaches. Stationed in Iraq, Afghanistan, and Kuwait, American and European soldiers alike realized how liberal their home cultures were. Arriving in North America, visitors from Japan and India struggle to understand why so many people wear their dirty street shoes in the house.


I MISS HANDSHAKES.

The New Yorker Collection, 2010, Harry Bliss, from cartoonbank.com. All Rights Reserved

But humans in varied cultures nevertheless share some basic moral ideas. Even before they can walk, babies prefer helpful people over naughty ones (Hamlin et al., 2011). Worldwide, people prize honesty, fairness, and kindness (McGrath, 2015). Yet each cultural group also evolves its own norms. The British have a norm for orderly waiting in line. Many South Asians use only the right hand for eating. Sometimes social expectations seem oppressive: "Why should it matter how I dress?" Yet, norms—how to greet, how to eat—grease the social machinery.

When cultures collide, their differing norms often befuddle. Should we greet people by shaking hands, bowing, or kissing each cheek? Knowing what sorts of gestures and compliments are culturally appropriate, we can relax and enjoy one another without fear of embarrassment or insult.

When we don't understand what's expected or accepted, we may experience *culture shock.* People from Mediterranean cultures have perceived northern Europeans as efficient but cold and preoccupied with punctuality (Triandis, 1981). People from time-conscious Japan—where bank clocks keep exact time, pedestrians walk briskly, and postal clerks fill requests speedily—have found themselves growing impatient when visiting Indonesia, where the pace of life is more leisurely (Levine & Norenzayan, 1999). Someone from the European community, which requires 20 paid vacation days each year, may also experience culture shock when working in the United States, which does not guarantee workers any paid vacation (Ray et al., 2013).

Variation Over Time

Like biological creatures, cultures vary and compete for resources, and thus evolve over time (Mesoudi, 2009). Consider how rapidly cultures may change. English poet Geoffrey Chaucer (1342–1400) is separated from a modern Briton by only 25 generations, but the two would have great difficulty communicating. At the beginning of the last century, your ancestors lived in a world without cars, radio broadcasting, or widespread electric power and light. In the thin slice of history since 1960, most Western cultures have changed with astonishing speed. Middle-class people enjoy the convenience of air-conditioned housing, online shopping, anywhere-anytime electronic communication, and—enriched by doubled per-person real income—eating out more than twice as often as did their grandparents back in the culture of 1960. Many people now enjoy expanded human rights. And with greater economic independence, today's women more often marry for love and less often endure abusive relationships.

But some changes seem not so wonderfully positive. Had you fallen asleep in the United States in 1960 and awakened today, you would open your eyes to a culture with more depression and more economic inequality. You would also find North Americans—like their counterparts in Britain, Australia, and New Zealand—spending more hours at work, fewer hours with friends and family, and fewer hours asleep (BLS, 2011; Putnam, 2000).

Whether we love or loathe these changes, we cannot fail to be impressed by their breathtaking speed. And we cannot explain them by changes in the human gene pool, which evolves far too slowly to account for high-speed cultural transformations. Cultures vary. Cultures change. And cultures shape our lives.

✓ Check Your Understanding

Ask Yourself

- How have you been influenced by group polarization in your online activities?

Test Yourself

- When like-minded groups discuss a topic, and the result is the strengthening of the prevailing opinion, this is called _______________ _______________.
- When a group's desire for harmony overrides its realistic analysis of other options, _______________ has occurred.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 76 REVIEW

76-1 How does the presence of others influence our actions via social facilitation, social loafing, and deindividuation?

- In *social facilitation,* the mere presence of others arouses us, improving our performance on easy or well-learned tasks but decreasing it on difficult ones.
- In *social loafing,* participating in a group project makes us feel less responsible, and we may free ride on others' efforts.
- When the presence of others both arouses us and makes us feel anonymous, we may experience *deindividuation*—loss of self-awareness and self-restraint.

76-2 How can group interaction enable group polarization?

- In *group polarization,* group discussions with like-minded others strengthen members' prevailing beliefs and attitudes.

76-3 What role does the Internet play in group polarization?

- Internet communication magnifies the effect of connecting like-minded people, for better and for worse. People find support, which strengthens their ideas, but also often isolation from those with different opinions. Separation plus conversation may thus lead to group polarization.

76-4 How can group interaction enable groupthink?

- *Groupthink* is driven by a desire for harmony within a decision-making group, overriding realistic appraisal of alternatives.
- Group leaders can harness the benefits of group interaction by assigning people to identify possible problems, and by welcoming various opinions and expert critique.

76-5 How does culture affect our behavior?

- A *culture* is a set of behaviors, ideas, attitudes, values, and traditions shared by a group and transmitted from one generation to the next.
- Cultures differ across time and space.

Multiple-Choice Questions

1. Maggie is an excellent hockey player, and she is playing in the final hockey game of her high school career. The cheering of the fans causes her to score three goals in the game, a record for her. The most likely explanation for her performance is

a. social loafing.
b. group behavior.
c. social facilitation.
d. deindividuation.
e. group polarization.

2. Following a natural disaster, it is not uncommon for large groups of people to loot stores and take far more than they might need to help them survive the situation. This behavior is best explained by the concept of

a. culture.
b. social facilitation.
c. groupthink.
d. deindividuation.
e. group polarization.

3. Marie disagrees with the answer her math review group comes up with. She does not voice her own answer because she does not want to go against the group. Marie is being affected by

a. group polarization.
b. groupthink.
c. social loafing.

d. social facilitation.
e. cultural influences.

4. The enduring behaviors, ideas, attitudes, values, and traditions shared by a group of people and transmitted from one generation to the next is known as

a. deindividuation.
b. groupthink.
c. social facilitation.
d. culture.
e. social loafing.

Practice FRQs

1. Describe the four possible causes of social loafing.

Answer

1 point: People acting as part of a group feel less accountable. Page 785

1 point: Group members may view their individual contributions as dispensable. Page 785

1 point: People in a group may overestimate their own efforts, not considering how much others are contributing. Page 785

1 point: Unless highly motivated and strongly identified with the group, people may free ride on others' efforts. Page 785

2. Anonymous reviews of restaurants tend to be more negative than those where the name of the reviewer is attached. Explain why this is, using the following terms: *deindividuation* and *group polarization.*

(2 points)

Module **77 Prejudice and Discrimination**

LEARNING TARGETS

- **77-1 Define *prejudice*, and describe how explicit and implicit prejudice differ.**
- **77-2 Discuss the groups that are frequent targets of prejudice.**
- **77-3 Discuss some social, emotional, and cognitive roots of prejudice, and some ways to eliminate prejudice.**

77-1 What is *prejudice?* How do explicit and implicit prejudice differ?

Social psychology studies how we think about and influence one another, and also how we *relate* to one another. What causes people sometimes to hate and harm, and other times to love and help one another? And when destructive conflicts arise, how can we move toward a just peace? In this module and the next, we ponder insights into *antisocial* relations gleaned by researchers who have studied prejudice and aggression.

Prejudice means “prejudgment.” It is an unjustifiable and usually negative *attitude* toward a group and its members—who often are people of a particular racial or ethnic group, gender, sexual orientation, or belief system. You may recall that *attitudes* are feelings, influenced by beliefs, that predispose us to act in certain ways. In prejudice, the ingredients in this three-part mixture are

prejudice

an unjustifiable (and usually negative) attitude toward a group and its members. Prejudice generally involves stereotyped beliefs, negative feelings, and a predisposition to discriminatory action.

- *negative emotions,* such as hostility or fear.
- **stereotypes**, which are generalized beliefs about a group of people. Our stereotypes sometimes reflect reality. If you presume that young men tend to drive faster than elderly women, you may be right. But stereotypes often overgeneralize or exaggerate—as when liberals and conservatives overestimate the extremity of the other’s views, or Christians and atheists misperceive each other’s values (Graham et al., 2012; Simpson & Rios, 2016).
- *a predisposition to* **discriminate**—*to act in negative and unjustifiable ways toward members of the group.* Sometimes discrimination is blatant. Other times it is more subtle, taking the form of *microaggressions,* such as race-related traffic stops, a reluctance to choose a train seat next to someone of a different race, or longer Uber wait times and less Airbnb acceptance for people with African-American names (Edelman et al., 2017; Ge et al., 2016; Wang, J. et al., 2011).

stereotype

a generalized (sometimes accurate but often overgeneralized) belief about a group of people.

discrimination

unjustifiable negative behavior toward a group and its members.

Prejudice is a negative *attitude. Ethnocentrism*—assuming the superiority of one’s ethnic group—is one example of prejudice. To believe that a person of another ethnicity is somehow inferior or threatening, and to feel dislike for that person, is to be prejudiced. Discrimination is a negative *behavior.* To pass over that person on a dating site, or to reject that person as a job candidate, is to discriminate.

Explicit and Implicit Prejudice

Again and again, we have seen that our brain processes thoughts, memories, and attitudes on two different tracks. Sometimes that processing is *explicit*—on the radar screen of our awareness. More often, it is *implicit*—an unthinking knee-jerk response operating below the radar, leaving us unaware of how our attitudes are influencing our behavior. In 2015, the U.S. Supreme Court, in upholding the Fair Housing Act, recognized implicit bias research, noting that "unconscious prejudices" can cause discrimination even when people do not consciously intend to discriminate.

> "*We're also guarding against the subtle impulse to call Johnny back for a job interview but not Jamal.*"
>
> *President Barack Obama, funeral for Clementa Pinkney, 2015*

Psychologists study implicit prejudice by

- ***Testing for unconscious group associations:*** Tests in which people quickly pair a person's image with a trait demonstrate that even people who deny any racial prejudice may harbor negative associations (Banaji & Greenwald, 2013). Millions of people have taken the Implicit Association Test (at Implicit.Harvard.edu). Although the test is useful for studying automatic prejudice, critics question its reliability and caution against using it to assess or label individuals (Oswald et al., 2013, 2015). Defenders counter that implicit biases predict behaviors ranging from simple acts of friendliness to the evaluation of work quality (Greenwald et al., 2015).
- ***Considering unconscious patronization:*** In one experiment, White university women assessed flawed student essays they believed had been written by either a White or a Black student. The women gave low evaluations, often with harsh comments, to the essays supposedly written by a White student. When the same essay was attributed to a Black student, their assessment was more positive (Harber, 1998). Did

the evaluators calibrate their evaluations to their racial stereotypes, leading to less exacting standards and a patronizing attitude? In real-world evaluations, such low expectations and the resulting "inflated praise and insufficient criticism" could hinder minority student achievement, the researcher noted.

- ***Monitoring reflexive bodily responses:*** Even people who consciously express little prejudice may give off telltale signals as their body responds selectively to an image of a person from another ethnic group. Neuroscientists can detect signals of implicit prejudice in the viewer's facial-muscle responses and in the activation of the emotion-processing amygdala (Cunningham et al., 2004; Eberhardt, 2005; Stanley et al., 2008).

AP® EXAM TIP

It's worth spending a little time focusing on the distinction between *discrimination, prejudice,* and *stereotype.* They are related, but different. Be able to distinguish them in examples.

KAMIL KRZACZYNSKI/EPA/Newscom

Homegrown terrorism In the 16 years following the terror of September 11, 2001, many Americans feared attacks from foreign terrorists. Yet since that time, attacks by homegrown White supremacists and other non-Muslim extremists were nearly twice as likely (Shane, 2015)—as when a neo-Nazi slaughtered six people in a 2012 shooting at a Wisconsin Sikh temple.

Targets of Prejudice

77-2 What groups are frequent targets of prejudice?

Racial and Ethnic Prejudice

Americans’ expressed racial attitudes have changed dramatically in the last half-century. Support for interracial dating between Blacks and Whites, for example, has increased dramatically, from a 48 percent approval rate in 1987 to 86 percent in 2012 (Pew, 2012; see also **Figure 77.1**). Similarly, 4 percent of Americans approved of “marriage between Blacks and Whites” in 1958, but 87 percent approved in 2013 (Newport, 2013). Six in ten Americans—double the number in most European countries—agree that “an increasing number of people of many different races, ethnic groups, and nationalities in our country makes it a better place to live” (Drake & Poushter, 2016).

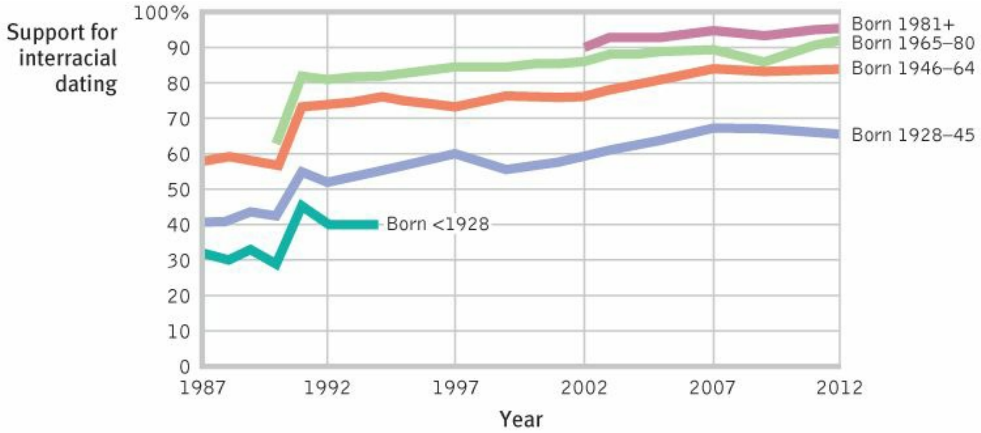


Figure 77.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Pew, 2012.

Figure 77.1 Prejudice over time

Over the last quarter-century, Americans have increasingly approved of interracial dating, with each successive generation expressing more approval.

Yet as blatant interracial prejudice wanes, *subtle* prejudice lingers. People with darker skin tones experience greater criticism and accusations of immoral behavior (Alter et al., 2016). In one study of White medical students and residents, 1 in 3 believed “black people’s skin is thicker than white people’s skin,” which led them to make harmful treatment recommendations (Hoffman et al., 2016). And although many people *say* they would feel upset with someone making racist or homophobic slurs, they respond indifferently when they actually hear prejudice-laden language (Kawakami et al., 2009).

> “*Unhappily, the world has yet to learn how to live with diversity.*”
>
> *Pope John Paul II, Address to the United Nations, 1995*

Other studies reveal prejudice that is not just subtle, but unconscious (implicit). For example, in an Implicit Association Test, 9 in 10 White respondents took longer to identify pleasant words (such as *peace* and *paradise*) as “good” when presented with Black-sounding names (such as *Latisha* and *Darnell*) rather than with White-sounding names (such as *Katie* and *Ian*). Moreover, people who more quickly associate good things with White names or faces also are the quickest to perceive anger and apparent threat in Black faces (Hugenberg & Bodenhausen, 2003). A greater association of pleasant words with the racial terms “White” than “Black” has also been observed in more than 800 billion Internet words (Caliskan et al., 2017). In the 2008 U.S. presidential election, those demonstrating explicit *or* implicit prejudice were less likely to vote for candidate Barack Obama. His election in turn served to reduce implicit prejudice (Bernstein et al., 2010; Payne et al., 2010; Stephens-Davidowitz, 2014).

> “*If we can’t help our latent biases, we can help our behavior in response to those instinctive reactions, which is why we work to design systems and processes that overcome that very human part of us all.*”
>
> *U.S. FBI Director James B. Comey, “Hard Truths: Law Enforcement and Race,” 2015*

Our perceptions can also reflect implicit bias. In 1999, Amadou Diallo was accosted as he approached his apartment house doorway by police officers looking for a rapist. When he pulled out his wallet, the officers, perceiving a gun, riddled his body with 19 bullets from 41 shots. In one analysis of 59 unarmed suspect shootings in Philadelphia over seven years, 49 involved the misidentification of an object (such as a cell phone) or movement (such as pants tugging). Black suspects were more than twice as likely to be misperceived as threatening, even by Black officers (Blow, 2015). During 2015–2016, African Americans, who are 13 percent of the U.S. population, were nearly 40 percent of the unarmed people shot and killed by police (*Washington Post*, 2017).

To better understand such tragic shootings of unarmed, innocent people, two research teams simulated the situation (Correll et al., 2007, 2015; Plant & Peruche, 2005; Sadler et al., 2012). They asked viewers to press buttons quickly to “shoot” or not shoot men who suddenly appeared on screen. Some of the onscreen men held a gun. Others held a harmless object, such as a flashlight or bottle. People (both Blacks and Whites, and police officers) more often shot Black men holding the harmless object. Priming people with a flashed Black face rather than a White face also made them more likely to misperceive a flashed tool as a gun (**Figure 77.2**). Fatigue, which diminishes one’s conscious control and increases automatic reactions, amplifies racial bias in decisions to shoot (Ma et al., 2013).

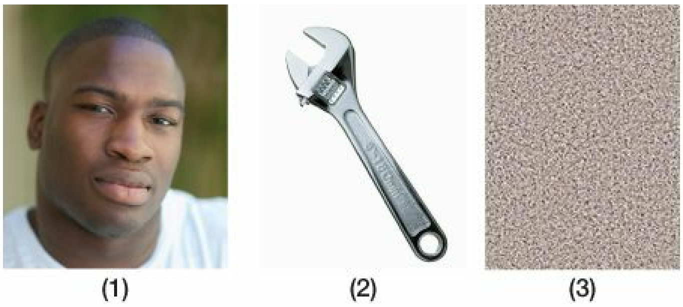


Figure 77.2
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
(1) © Inti St Clair/Blend Images/Corbis; (2) JLP/Jose L. Pelaez/Corbis

Figure 77.2 Race primes perceptions

In experiments by Keith Payne (2006), people viewed (1) a White or Black face, immediately followed by (2) a flashed gun or hand tool, which was then followed by (3) a masking screen. Participants were more likely to misperceive a tool as a gun when it was preceded by a Black rather than White face.

Gender Prejudice

Overt gender prejudice has declined sharply. The one-third of Americans who in 1937 told Gallup pollsters that they would vote for a qualified woman whom their party nominated for president soared to 95 percent in 2012 (Jones, 2012; Newport, 1999). Although women worldwide still represent nearly two-thirds of illiterate adults, and 30 percent have experienced intimate partner violence, 65 percent of all people now say it is very important that women have the same rights as men (UN, 2015; WHO, 2016; Zainulbhai, 2016).

> “*Until I was a man, I had no idea how good men had it at work. . . . The first time I spoke up in a meeting in my newly low, quiet voice and noticed that sudden, focused attention, I was so uncomfortable that I found myself unable to finish my sentence.*”
>
> *Thomas Page McBee, 2016, after transitioning from female to male*

Nevertheless, both implicit and explicit gender prejudice and discrimination persist. In Western countries, we pay more to those (usually men) who care for our streets than to those (usually women) who care for our children. Gender bias even applies to beliefs about intelligence: Despite equality between the sexes in intelligence scores, people have tended to perceive their fathers as more intelligent than their mothers and their sons as brighter than their daughters (Furnham, 2016).

Rex Features via AP Images

When tragedy triggers a national response Does implicit bias research—which is now being integrated into both police and corporate diversity training programs—help us understand the 2013 death of Trayvon Martin (shown here 7 months before he was killed)? As he walked alone to his father's fiance's house in a gated Florida neighborhood, a suspicious resident started following him. A confrontation led to the unarmed Martin being shot. Martin's death sparked public outrage related to racism, gun control, and social justice. Commentators wondered: Had Martin been an unarmed White teen, would he have been perceived and treated the same way?

Unwanted female infants are no longer left out on a hillside to die of exposure, as was the practice in ancient Greece. Yet the normal male-to-female newborn ratio (105-to-100) hardly explains the world's estimated 163 million (say that number slowly) "missing women" (Hvistendahl, 2011). In many places, sons are valued more than daughters. In India, there are 3.5 times more Google searches asking how to conceive a boy than how to conceive a girl (Stephens-Davidowitz, 2014). With scientific testing that enables sex-selective abortions, some countries are experiencing a shortfall in female births. India's newborn sex ratio was recently 112 boys for every 100 girls. China's has been 111 to 100—despite China's declaring sex-selective abortions—gender genocide—a criminal offense (CIA, 2014). With under-age-20 males exceeding females by 32 million, many Chinese bachelors will be unable to find mates (Zhu et al., 2009). A shortage of women also contributes to increased crime, violence, prostitution, and trafficking of women (Brooks, 2012).

LGBTQ Prejudice

In most of the world, gay and lesbian people cannot openly and comfortably disclose who they are and whom they love (Katz-Wise & Hyde, 2012; UN, 2011). Although by 2016 two dozen countries had allowed same-sex marriage, dozens more had laws criminalizing same-sex relationships. Cultural variation is enormous—ranging from the 98 percent in Ghana who say that "homosexuality is morally unacceptable" to 6 percent in Spain (Pew, 2014). Worldwide, anti-gay attitudes are most common among men, older adults, and those who are unhappy, unemployed, and less educated (Haney, 2016; Jäckle & Wenzelburger, 2015).

Explicit anti-gay prejudice, though declining in Western countries, persists. When experimenters sent thousands of responses to employment ads, those whose resumes included "Treasurer, Progressive and Socialist Alliance" received more replies than did resumes that specified "Treasurer, Gay and Lesbian Alliance" (Agerstro..m et al., 2012; Bertrand & Mullainathan, 2003; Drydakis, 2009). Other evidence has appeared in national surveys of LGBTQ Americans:

- 39 percent reported having been "rejected by a friend or family member" because of their sexual orientation or gender identity (Pew, 2013a).
- 58 percent reported being "subject to slurs or jokes" (Pew, 2013a).
- 80 percent of LGBTQ adolescents reported sexual orientation-related harassment in the prior year (GLSEN, 2012). Gays and lesbians are also America's most at-risk group for hate crimes (Sherman, 2016).

Do attitudes and practices that label, disparage, and discriminate against gay and lesbian people increase their risk of psychological disorder and ill health? In U.S. states without protections against LGBTQ hate crime and discrimination, gay and lesbian people experience substantially higher rates of depression and related disorders, even after controlling for income and education differences. In communities where anti-gay prejudice is high, so are gay and lesbian suicide and cardiovascular deaths. In 16 states that banned same-sex marriage between 2001 and 2005, gays and lesbians (but not heterosexuals) experienced a 37 percent increase in depressive disorder rates, a 42 percent increase in alcohol use disorder, and a 248 percent increase in generalized anxiety disorder. Meanwhile, gays and lesbians in other states did not experience increased psychiatric disorders (Hatzenbuehler, 2014).

Belief Systems Prejudice

In the aftermath of the 9/11 terrorist attacks, the Iraq and Afghanistan wars, and the rise of terrorist groups such as ISIS, many Americans have developed irrational fear and anger directed toward all Muslims (and all those they *think* might be Muslim). As a result, 48 percent of Muslim Americans have reported personally experiencing discrimination in the last year—more than double the average among U.S. Jews, Catholics, and Protestants (Gallup, 2017). As opposition to Islamic mosques and immigration has flared, one observer noted that "Muslims are one of the last minorities in the United States that it is still possible to demean openly" (Kristof, 2010; Lyons et al., 2010).

Roots of Prejudice

77-3 What are some social, emotional, and cognitive roots of prejudice, and what are some ways to eliminate prejudice?

Prejudice springs from a culture’s divisions, the heart’s passions, and the mind’s natural workings.

Social Inequalities and Divisions

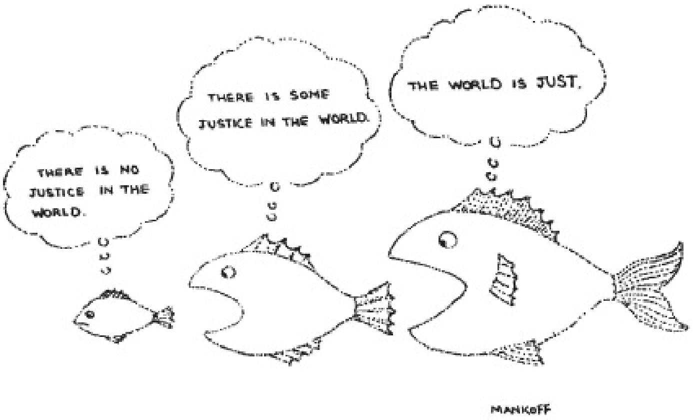
Flip It Video: Ingroup and Outgroup Bias

When some people have money, power, and prestige and others do not, the “haves” usually develop attitudes that justify things as they are. The **just-world phenomenon** reflects an idea we commonly teach our children—that good is rewarded and evil is punished. From this it is but a short and sometimes automatic leap to assume that those who succeed must be good and those who suffer must be bad. Such reasoning enables the rich to see both their own wealth and the poor’s misfortune as justly deserved. When slavery existed in the United States, slaveholders perceived slaves as innately lazy, ignorant, and irresponsible—as having the very traits that justified enslaving them. Stereotypes rationalize inequalities.

just-world phenomenon

the tendency for people to believe the world is just and that people therefore get what they deserve and deserve what they get.

Victims of discrimination may react with either self-blame or anger (Allport, 1954). Either reaction can feed others’ prejudice through the classic *blame-the-victim* dynamic. Do the circumstances of poverty breed a higher crime rate? If so, that higher crime rate can be used to justify discrimination against those who live in poverty.


THERE IS NO JUSTICE IN THE WORLD.
THERE IS SOME JUSTICE IN THE WORLD.
THE WORLD IS JUST.
MANKOFF

Robert Mankoff The New Yorker Collection/The Cartoon Bank

Dividing the world into “us” and “them” can entail conflict, racism, and war, but it also provides the benefits of communal solidarity. Thus, we cheer for our groups, kill for them, die for them. Indeed, we define who we are—our *social identity*—partly in terms of our groups (Greenaway et al., 2016; Hogg, 1996, 2006; Turner, 1987, 2007). When Ian identifies himself as a man, an Aussie, a University of Sydney student, a Catholic, and a MacGregor, he knows who he is, and so do we. Mentally drawing a circle defines “us,” the **ingroup**. But the social definition of who we are also states who we are not. People outside that circle are “them,” the **outgroup**. An **ingroup bias**—a favoring of our own group—soon follows. In experiments, people have favored their own group (arbitrarily created by a simple coin toss) when dividing rewards (Tajfel, 1982; Wilder, 1981). Outside the lab, discrimination is often triggered not by outgroup hostility but by ingroup networking and mutual support, such as hiring a friend’s child at the expense of other candidates (Greenwald & Pettigrew, 2014).

ingroup

“us”—people with whom we share a common identity.

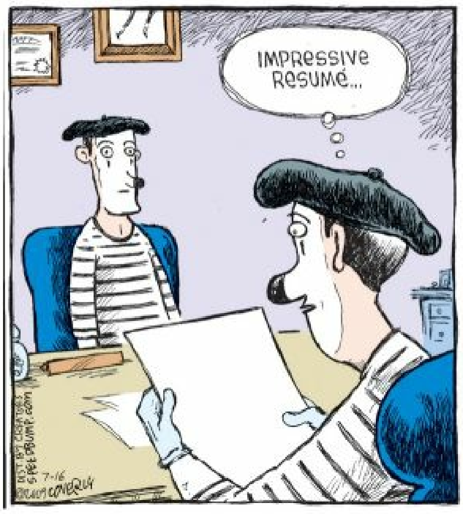
outgroup

“them”—those perceived as different or apart from our ingroup.

ingroup bias

the tendency to favor our own group.

We have inherited our Stone Age ancestors' need to belong, to live and love in groups. There was safety in solidarity: Whether hunting, defending, or attacking, 10 hands were better than 2. Evolution prepared us, when encountering strangers, to make instant judgments: friend or foe? This urge to distinguish enemies from friends, and to "otherize" as different those not like us, predisposes prejudice against strangers (Whitley, 1999). To Greeks of the classical era, all non-Greeks were "barbarians." In our own era, most students believe their school is better than all other schools in town. Perhaps you can recall being most conscious of your school identity when competing with an archrival school. Many high school students form cliques—jocks, preps, nerds—and disparage those outside their own group. Even chimpanzees have been seen to wipe clean the spot where they were touched by a chimpanzee from another group (Goodall, 1986). They also display ingroup empathy by yawning more after seeing ingroup (rather than outgroup) members yawn (Campbell & de Waal, 2011). An ideal world might equally prioritize justice and love for all. But in our real world, ingroup love often outranks universal justice.


IMPRESSIVE RESUMÉ...

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Negative Emotions

Negative emotions nourish prejudice. When facing death, fearing threats, or experiencing frustration, people cling more tightly to their ingroup and their friends. As fears of terrorism heighten patriotism, they also produce loathing and aggression toward "them"—those who threaten our world

(Pyszczynski et al., 2002, 2008). **Scapegoat theory** notes that when things go wrong, finding someone to blame can provide a target for our negative emotions. Following the 9/11 attacks, some outraged people lashed out at innocent Arab-Americans. A decade later, anti-Muslim animosities still flare. In 2015, anti-Muslim hate crimes rose 67 percent from the year before (FBI, 2016). And after anti-immigrant sentiments flared in 2016 during the Brexit referendum in Britain and the contentious presidential election in the United States, reports of harassment, bullying, and hate crime rose (Crandall & White, 2016; Hassan, 2016; Kenyon, 2016; North, 2016). “Fear and anger create aggression, and aggression against citizens of different ethnicity or race creates racism and, in turn, new forms of terrorism,” noted Philip Zimbardo (2001).

scapegoat theory

the theory that prejudice offers an outlet for anger by providing someone to blame.

HOPE
HOPE 40

Courtesy Hope College Public Relations

The ingroup Basketball fans, shown here from my [DM’s] own college during a game against their archrival, share a social identity that defines “us” (the ingroup) and “them” (the outgroup).

Evidence for the scapegoat theory of prejudice comes in two forms: (1) Economically frustrated people tend to express heightened prejudice. (2) Experiments that create temporary frustration intensify prejudice. Students who experience failure or are made to feel insecure often restore their self-esteem by belittling a rival school or another person (Cialdini & Richardson, 1980; Crocker et al., 1987). Denigrating others may boost our own sense of status, which explains why a rival's misfortune sometimes provides a twinge of pleasure. (The German language has a word—*Schadenfreude*—for this secret joy that we sometimes take in another's failure.) By contrast, those made to feel loved and supported become more open to and accepting of others who differ (Mikulincer & Shaver, 2001).

> “*If the Tiber reaches the walls, if the Nile does not rise to the fields, if the sky doesn't move or the Earth does, if there is famine, if there is plague, the cry is at once: 'The Christians to the lion!'*”
>
> *Tertullian,* Apologeticus, *197* C.E.

Cognitive Shortcuts

Stereotyped beliefs are in part a by-product of how we cognitively simplify the world. To help understand the world around us, we sometimes *form categories.* Chemists categorize molecules as organic and inorganic. A basketball coach categorizes offensive players as guards and post players. Therapists categorize psychological disorders. We all categorize people by gender, ethnicity, race, age, and many other characteristics. But when we categorize people into groups, we often stereotype. We recognize how greatly *we* differ from other individuals in *our* groups. But we overestimate the extent to which members of other groups are alike (Bothwell et al., 1989). We perceive *outgroup homogeneity*—uniformity of outgroup attitudes, personality, and appearance. Our greater recognition for individual own-race faces—called the **other-race effect** (or *cross-race effect* or *own-race bias*)—emerges during infancy, between 3 and 9 months of age (Anzures et al., 2013; Telzer et al., 2013). (We also have an *own-age bias*—better recognition memory for faces of our own age group

[Rhodes & Anastasi, 2012]).

other-race effect

the tendency to recall faces of one’s own race more accurately than faces of other races. Also called the *cross-race effect* and the *own-race bias.*

AP® EXAM TIP

Pause for a minute and try to identify examples of the just-world phenomenon, ingroup bias, and scapegoating in your own school.

> “*The misfortunes of others are the taste of honey.*”
>
> *Japanese saying*

Sometimes, however, people don’t fit easily into our racial categories. For example, mixed-race people are often assigned to their minority identity. Researchers believe this happens because, after learning the features of a familiar racial group, the observer’s selective attention is drawn to the distinctive features of the less-familiar minority. Researchers illustrated this learned-association effect by showing New Zealanders blended Chinese-Caucasian faces (Halberstadt et al., 2011). Compared with participants of Chinese descent, European-descent New Zealanders more readily classified ambiguous faces as Chinese (see **Figure 77.3**). With effort and with experience, people get better at recognizing individual faces from another group (Hugenberg et al., 2010; Young et al., 2012).

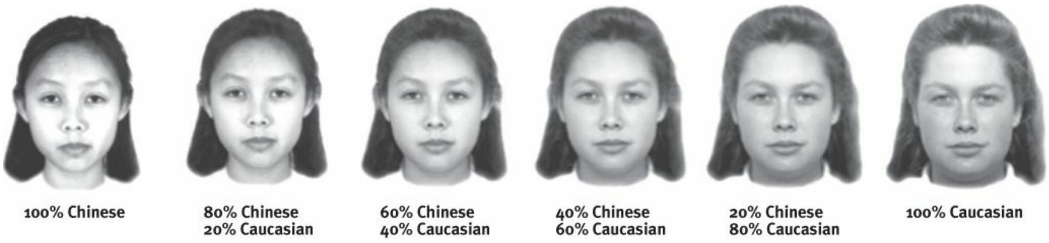
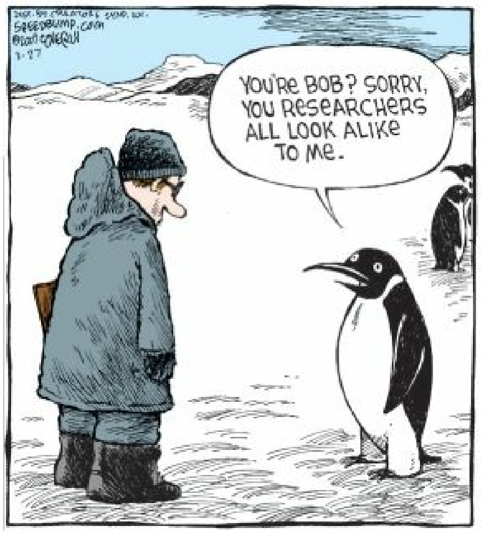

100% Chinese
80% Chinese 20% Caucasian
60% Chinese 40% Caucasian
40% Chinese 60% Caucasian
20% Chinese 80% Caucasian
100% Caucasian

Figure 77.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Dr. Jamin Halberstadt

Figure 77.3 Categorizing mixed-race people

When New Zealanders quickly classified 104 photos by race, those of European descent more often than those of Chinese descent classified the ambiguous middle two as Chinese (Halberstadt et al., 2011).


YOU'RE BOB? SORRY, YOU RESEARCHERS ALL LOOK ALIKE TO ME.

© Dave Coverly/speedbump.com

Remembering Vivid Cases

As we saw in Module 35, we also simplify our world by employing *heuristics*—mental shortcuts that enable snap judgments. The *availability heuristic* is the tendency to estimate the frequency of an event by how readily it comes to mind. Vivid cases are memorable and they come to mind easily, so it's no surprise that they feed our stereotypes. In a classic experiment, researchers showed two groups of University of Oregon students lists containing information about 50 men (Rothbart et al., 1978). The first group's list included 10 men arrested for *nonviolent* crimes, such as forgery. The second group's list included 10 men arrested for *violent* crimes, such as assault. Later, both groups were asked how many men on their list had committed *any* sort of crime. The second group overestimated the number. Violent crimes form vivid memories (**Figure 77.4**).

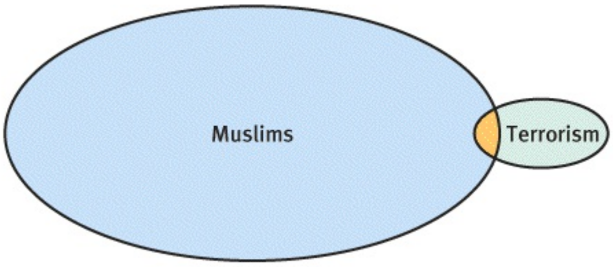


Figure 77.4
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 77.4 Vivid cases feed stereotypes

Global terrorism has created, in many minds, an exaggerated stereotype of Muslims as terrorism-prone. Actually, reported a U.S. National Research Council panel on terrorism, when offering this inexact illustration, most terrorists are not Muslim and "the vast majority of Islamic people have no connection with and do not sympathize with terrorism" (Smelser & Mitchell, 2002).

Victim Blaming

As we noted earlier, people often justify their prejudices by blaming victims. If the world is just, they assume, people must get what they deserve. As one German civilian is said to have remarked when visiting the Bergen-Belsen concentration camp shortly after World War II, "What terrible criminals these prisoners must have been to receive such treatment."

Hindsight bias amplifies victim blaming (Carli & Leonard, 1989). Have you ever heard people say that rape victims, abused spouses, or people with AIDS got what they deserved? In some countries, such as Pakistan, rape victims have been sentenced to severe punishment for violating adultery prohibitions (Mydans, 2002). In one experiment, two groups of people were given a detailed account of a date (Janoff-Bulman et al., 1985). The first group's account reported that the date ended with the woman being raped. Members of that group perceived the woman's behavior as at least partly to blame, and in hindsight, they thought, “She should have known better.” The second group, given the same account with the rape ending deleted, did not perceive the woman’s behavior as inviting rape. Hindsight bias promoted a blame-the-victim mentality among members of the first group. Blaming the victim also serves to reassure people that it couldn’t happen to them.

People also have a basic tendency to justify their culture’s social systems (Jost et al., 2009; Kay et al., 2009). We’re inclined to see the way things are as the way they ought to be and deserve to be. If people are rich, they must be smart (Hussak & Cimpian, 2015). This natural conservatism makes it difficult to legislate major social changes, such as health care or climate change policies. Once such policies are in place, our “system justification” tends to preserve them.

If your own gut-check reveals you sometimes have feelings you would rather not have about other people, remember this: It is what we *do* with our feelings that matters. By monitoring our feelings and actions, and by replacing old habits with new ones based on new friendships, we can work to free ourselves from prejudice.

✓ Check Your Understanding

Ask Yourself

- What are some examples of ingroup bias in your community?

Test Yourself

- What is the difference between prejudice and discrimination?
- When prejudiced judgment causes us to blame an undeserving person for a problem, that person is called a _______________.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 77 REVIEW

77-1 What is *prejudice?* How do explicit and implicit prejudice differ?

- *Prejudice* is an unjustifiable, usually negative attitude toward a group and its members.
- Prejudice's three components are beliefs (often *stereotypes*), emotions, and predispositions to action *(discrimination).*
- Explicit (overt, observable) prejudice in North America has decreased over time, but implicit prejudice—an unthinking knee-jerk response operating below conscious awareness—continues. Psychologists study implicit prejudice by testing for unconscious group associations, considering unconscious patronization, and monitoring reflexive bodily responses.

77-2 What groups are frequent targets of prejudice?

- Prejudice involves both explicit and implicit negative attitudes toward people of a particular racial or ethnic group, gender, sexual orientation, or belief system.

77-3 What are some social, emotional, and cognitive roots of prejudice, and what are some ways to eliminate prejudice?

- The social roots of prejudice include social inequalities and divisions.
    - Higher-status groups often justify their privileged position with the *just-world phenomenon.*
    - We tend to favor our own group *(ingroup bias)* as we divide ourselves into "us" (the *ingroup*) and "them" (the *outgroup*).
- Prejudice can also be a tool for protecting our emotional well-being, as when we focus our anger by blaming events on a *scapegoat.*

- The cognitive roots of prejudice grow from our natural ways of processing information: forming categories, remembering vivid cases, and believing that the world is just (and that our own and our group's ways of doing things are the right ways).
- Monitoring our feelings and actions, as well as developing new friendships, can help us free ourselves from prejudice.

Multiple-Choice Questions

1. The primary distinction between prejudice and discrimination is that

a. prejudice is cognitive and discrimination is a behavior.
b. prejudice is based on anger and discrimination is based on fear.
c. prejudice is a legal term and discrimination is a psychological term.
d. prejudice typically develops in infancy and discrimination typically develops in adolescence.
e. discrimination is primarily caused by nature and prejudice is primarily caused by nurture.

2. In recent years,

a. both explicit and implicit prejudice have shown steady and equal increases.
b. explicit prejudice has decreased, but implicit prejudice has not.
c. both explicit and implicit prejudice have been increasing, but explicit prejudice is increasing at a faster rate.
d. both explicit and implicit prejudice have been increasing, but implicit prejudice is increasing at a faster rate.
e. explicit prejudice has been decreasing more than implicit prejudice.

3. Which of the following accurately describes the just-world phenomenon?

a. It's the reduction in prejudice that has resulted from improvements in our laws and judicial system.
b. It's the reduction in discrimination that has resulted from improvements in our laws and judicial system.

c. It's the belief that most people get what they deserve and deserve what they get.
d. It's the tendency of people to deny that prejudice is still a problem.
e. It's a reflection of our desire to categorize daily events as "unfair."

4. Which of the following is an example of ingroup bias?

a. Hinata talked only to her five best friends when she was in ninth grade.
b. Sabrina has been a New York Yankees fan since she was in fourth grade.
c. Kimia believes she is the best student in her AP® psychology class, but her grades are not as good as several other students.
d. Francisco believes he is the best student in his AP® psychology class, and in fact he has the highest test average.
e. Derek believes his T-ball team is the best in the league and that the other teams in the league have no talented players.

5. What is the best explanation for why Carl, an African-American, was better able to describe the African-American man who robbed his store than he was able to describe the Caucasian man who was with him?

a. Scapegoat theory
b. A vivid case
c. Just-world phenomenon
d. The other-race effect
e. Ingroup bias

Practice FRQs

1. Give an example that is not mentioned in the text for each of the three major components of prejudice.

Answer

1 point: *Stereotyped judgments* are generalized, negative beliefs about a group of people, such as assuming they are all elitist or all lazy. The point is awarded for an example that is not cited in the text. ↩ Page 792

1 point: Prejudice also involves *negative emotions*, such as hostility or fear, toward the members of a group. The point is awarded for an example that is not cited in the text. ↩ Page 792

1 point: A *predisposition to discriminate* against members of a group could be expressed by refusing to date or hire people in that group. The point is awarded for an example that is not cited in the text. ↩ Page 792

2. Describe an example of a social root of prejudice, an emotional root of prejudice, and a cognitive root of prejudice.

(3 points)

Module **78 Aggression**

LEARNING TARGETS

- 78-1 Explain how psychology's definition of *aggression* differs from everyday usage, and identify the biological factors that make us more prone to hurt one another.
- 78-2 Outline the psychological and social-cultural triggers of aggression.

78-1 How does psychology's definition of *aggression* differ from everyday usage? What biological factors make us more prone to hurt one another?

Prejudice hurts, but aggression sometimes hurts more. In psychology, **aggression** is any physical or verbal behavior intended to harm someone, whether done out of hostility or as a calculated means to an end. The assertive, persistent salesperson is not aggressive. Nor is the dentist who makes you wince with pain. But the high school gossip who passes along a vicious rumor about you, the bully who torments you in person or online, and the attacker who mugs you for your money are aggressive.

aggression
any physical or verbal behavior intended to harm someone physically or emotionally.

Aggressive behavior emerges from the interaction of biology and experience. For a gun to fire, the trigger must be pulled; with some people, as with hair-trigger guns, it doesn’t take much to trip an explosion. Let’s look first at some biological factors that influence our thresholds for aggressive behavior, then at the psychological factors that pull the trigger.

The Biology of Aggression

Aggression varies too widely from culture to culture, era to era, and person to person to be considered an unlearned instinct. But biology does *influence* aggression. We can look for biological influences at three levels—genetic, neural, and biochemical.

Gilbert Laurie/Getty Images

Do guns in the home save or take more lives? “Personal safety/protection” is the #1 reason U.S. gun owners give for firearm ownership (Swift, 2013). Yet in the last 40 years, well over one million Americans have suffered nonwar firearm deaths—more than all American war deaths. Compared with people of the same sex, race, age, and neighborhood, those who keep a gun in the home have been twice as likely to be murdered and three times as likely to commit suicide (Anglemyer et al., 2014; Stroebe, 2013). States and countries with high gun ownership rates also tend to have high gun death rates (VPC, 2013).

Genetic Influences

Genes influence aggression. Animals have been bred for aggressiveness—sometimes for sport, sometimes for research. The effect of genes also appears in human twin studies (Miles & Carey, 1997; Rowe et al., 1999). If one identical twin admits to “having a violent temper,” the other twin will often independently admit the same. Fraternal twins are much less likely to respond similarly.

Researchers continue to search for genetic markers in those who commit violent acts. One is already well known and is carried by half the human race: the Y chromosome. Another such marker is the *monoamine oxidase A (MAOA) gene,* which helps break down neurotransmitters such as dopamine and serotonin. Sometimes called the “warrior gene,” people who have low MAOA gene expression tend to behave aggressively when provoked. In one experiment, low (compared with high) MAOA gene carriers gave more unpleasant hot sauce to someone who provoked them (McDermott et al., 2009; Tiihonen et al., 2015).

Donald Reilly The New Yorker Collection/The Cartoon Bank

“It’s a guy thing.”

Neural Influences

There is no one spot in the brain that controls aggression. Aggression is a complex behavior, and it occurs in particular contexts. But animal and human brains have neural systems that, given provocation, will either inhibit or facilitate aggression (Falkner et al., 2016; Moyer, 1983; Wilkowski et al., 2011). Consider:

- Researchers implanted a radio-controlled electrode in the brain of the domineering leader of a caged monkey colony. The electrode was in an area that, when stimulated, inhibits aggression. When researchers placed the control button for the electrode in the colony’s cage, one small monkey learned to push it every time the boss became threatening.
- A neurosurgeon, seeking to diagnose a disorder, implanted an electrode in the amygdala of a mild-mannered woman. Because the brain has no sensory receptors, she was unable to feel the stimulation. But at the flick of a switch she snarled, “Take my blood pressure. Take it now,” then

stood up and began to strike the doctor.

- Studies of violent criminals have revealed diminished activity in the frontal lobes, which play an important role in controlling impulses. If the frontal lobes are damaged, inactive, disconnected, or not yet fully mature, aggression may be more likely (Amen et al., 1996; Davidson, 2000; Raine, 2013).

AP® EXAM TIP

Notice that you’re back to a nature and nurture analysis again. The biology section is, of course, the nature component. When you get to the psychological and social-cultural factors coming up, that’s nurture.

Biochemical Influences

Our genes engineer our individual nervous systems, which operate electrochemically. The hormone testosterone, for example, circulates in the bloodstream and influences the neural systems that control aggression. A raging bull becomes a gentle giant when castration reduces its testosterone level. Conversely, when injected with testosterone, gentle, castrated mice once again become aggressive.

Humans are less sensitive to hormonal changes. But as men’s testosterone levels diminish with age, hormonally charged, aggressive 17-year-olds mature into quieter and gentler 70-year-olds.

Facial width is testosterone-linked. A high facial width-to-height ratio is a predictor of men’s aggressiveness and prejudicial attitudes (Carré et al., 2009; Hehman et al., 2013; Stirrat & Perrett, 2010). Women apparently pick up on this by *perceiving* men with higher facial width-to-height ratios as more dominant (Valentine et al., 2014). Other high-testosterone-linked traits among males include irritability, assertiveness, impulsiveness, hard drug use, and low tolerance for frustration (Dabbs et al., 2001; McAndrew, 2009; Montoya et al., 2012; Olweus et al., 1988). Drugs that sharply reduce testosterone levels subdue men’s aggressive tendencies.

> “*We could avoid two-thirds of all crime simply by putting all able-bodied young men in cryogenic sleep from the age of 12 through 28.*”
>
> *David T. Lykken,* The Antisocial Personalities, *1995*

Another drug that sometimes circulates in the bloodstream—alcohol—*unleashes* aggressive responses to frustration. Across police data, prison surveys, and experiments, aggression-prone adults are more likely to drink, and to become violent when intoxicated (White et al., 1993). Alcohol is a disinhibitor—it slows brain activity that controls judgment and inhibitions. Under its influence, people may interpret ambiguous acts (such as being bumped in a crowd) as provocations and react accordingly (Bègue et al., 2010; Giancola & Corman, 2007). Alcohol has been a factor in 73 percent of homicides in Russia and 57 percent in the United States (Landberg & Norström, 2011).

Chris Courteau/AGE Fotostock

A lean, mean fighting machine—the testosterone-laden female hyena The hyena’s unusual embryology pumps testosterone into female fetuses. The result is revved-up young female hyenas who seem born to fight.

Those who just *think* they’ve imbibed alcohol can become more aggressive (Bègue et al., 2009). But so, too, will those who unknowingly ingest alcohol slipped into a drink. Thus, alcohol affects aggression both biologically and psychologically (Bushman, 1993; Ito et al., 1996; Taylor & Chermack, 1993).

Psychological and Social-Cultural Factors in Aggression

78-2 What psychological and social-cultural factors may trigger aggressive behavior?

Biological factors influence how easily aggression is triggered. But what psychological and social-cultural factors pull the trigger?

Aversive Events

Suffering sometimes builds character. In laboratory experiments, however, those made miserable have often made others miserable (Berkowitz, 1983, 1989). Aversive stimuli—hot temperatures, physical pain, personal insults, foul odors, cigarette smoke, crowding—can evoke hostility. A prime example of this phenomenon is the **frustration-aggression principle**: Frustration creates anger, which can spark aggression. Even hunger can feed anger—making people "hangry" (Bushman et al., 2014).

frustration-aggression principle

the principle that frustration—the blocking of an attempt to achieve some goal—creates anger, which can generate aggression.

The frustration-aggression link was illustrated in an analysis of 27,667 hit-by-pitch Major League Baseball incidents between 1960 and 2004 (Timmerman, 2007). Pitchers were most likely to hit batters when they had been frustrated by one of three events: the previous batter had hit a home run, the current batter had hit a home run the last time at bat, or the pitcher's teammate had been hit by a pitch in the previous half-inning. A separate study found a similar link between rising temperatures and the number of hit batters (Reifman et al., 1991; see **Figure 78.1**). When overheated, we think, feel, and act more aggressively.

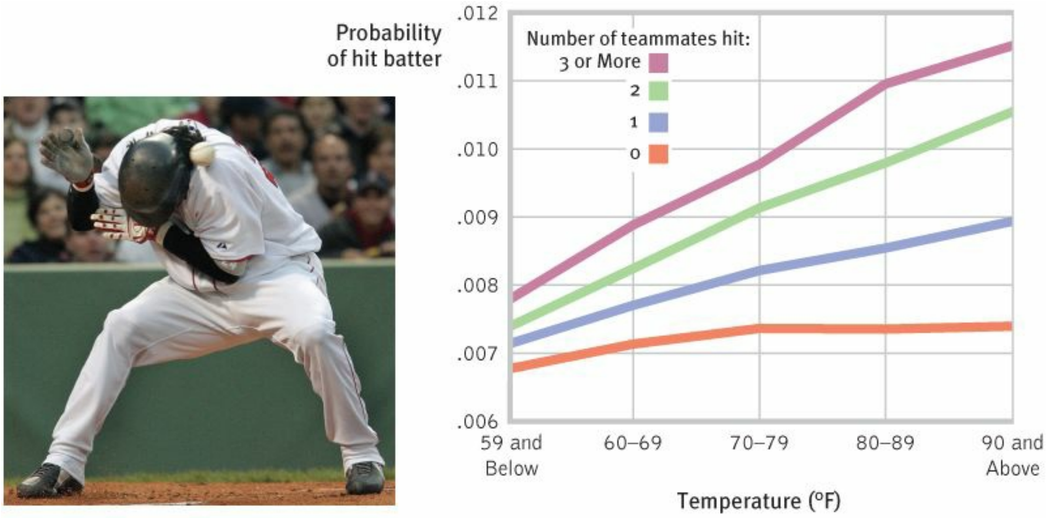


Figure 78.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Photo: Brita Meng Outzen/AP Photo

Figure 78.1 Temperature and retaliation

Researchers looked for occurrences of batters hit by pitchers during 4,566,468 pitcher-batter matchups across 57,293 Major League Baseball games since 1952 (Larrick et al., 2011). The probability of a hit batter increased if one or more of the pitcher's teammates had been hit, and also with temperature.

In the wider world, violent crime and spousal abuse rates have been higher during hotter years, seasons, months, and days (Anderson et al., 1997). Studies from archaeology, economics, geography, political science, and psychology converge in finding that throughout human history, higher temperatures have predicted increased individual violence, wars, and revolutions (Hsiang et al., 2013). Craig Anderson and his colleagues (2000, 2011) have projected that, other things being equal, global warming of 4 degrees Fahrenheit (about 2 degrees Celsius) could induce tens of thousands of additional assaults and murders—and that's before the added violence inducements from climate change–related drought, poverty, food insecurity, and migration.

Reinforcement, Modeling, and Self-Control

Aggression may naturally follow aversive events, but learning can alter natural reactions. As Unit VI explained, we learn when our behavior is reinforced, and we learn by watching others.

AP® EXAM TIP

This is a good opportunity to review Unit VI yet again. You should go back for a quick review if you don’t recognize the basic components of operant conditioning and observational learning in this material.

In situations where experience has taught us that aggression pays, we are likely to act aggressively again. Children whose aggression has successfully intimidated other children may become bullies. Animals that have successfully fought to get food or mates become increasingly ferocious. To foster a kinder, gentler world we had best model and reward sensitivity and cooperation from an early age, perhaps by training parents to discipline without modeling violence.

Parent-training programs often advise parents to avoid modeling violence by screaming and hitting. Instead, parents should reinforce desirable behaviors and frame statements positively. (“When you finish loading the dishwasher you can go play,” rather than “If you don’t load the dishwasher, there’ll be no playing.”)

Different cultures model, reinforce, and evoke different tendencies toward violence. For example, crime rates have also been higher and average happiness lower in times and places marked by a great disparity between rich and poor (Messias et al., 2011; Oishi et al., 2011; Wilkinson & Pickett, 2009). In the United States, cultures and families in which fathers are minimally involved have had high violence rates (Triandis, 1994). Even after controlling for parental education, race, income, and teen motherhood, American male youths from father-absent homes are incarcerated at twice the rate of their peers (Harper & McLanahan, 2004).

Violence can vary by culture within a country. Researchers analyzed violence among White Americans in southern towns settled by Scots-Irish herders whose tradition emphasized “manly honor,” the use of arms to protect one’s flock, and a history of coercive slavery (Nisbett & Cohen, 1996). Compared with their White counterparts in New England towns settled by the more traditionally peaceful Puritan, Quaker, and Dutch farmer-artisans, the cultural descendants of those herders had triple the homicide rates and were more supportive of physically punishing children, of warfare initiatives, and of uncontrolled gun ownership. “Culture-of-honor” states also had higher rates of students bringing weapons to school and of school shootings (Brown et al., 2009).

Media Models for Violence

Parents are hardly the only aggression models. In the United States and elsewhere, TV, films, video games, and the Internet offer supersized portions of violence. An adolescent boy faced with a real-life challenge may “act like a man”—at least like an action-film man—by intimidating or eliminating the threat. As we learned in Module 30, violent video game playing tends to make us less sensitive to cruelty (Arriaga et al., 2015). It also primes us to respond aggressively when provoked. And media violence teaches us **social scripts**—culturally provided mental files for how to act in certain situations. As more than 100 studies confirm, we sometimes imitate what we’ve viewed. Watching risk-glorifying behaviors (dangerous driving, extreme sports, unprotected sex) increases real-life risk-taking (Fischer et al., 2011).

social script

a culturally modeled guide for how to act in various situations.

Music lyrics also write social scripts. German university men who listened to woman-hating lyrics administered the most hot chili sauce to a woman. They also recalled more negative feelings and beliefs about women. Listening to man-hating lyrics had a similar effect on women (Fischer & Greitemeyer, 2006).

How does repeatedly watching pornographic films affect viewers? As pornography has become more easily available, rates of reported sexual violence have decreased in the United States (though not in Canada, Australia, and Europe). Nevertheless, just as repeated viewing of onscreen violence helps immunize us to aggression, repeated viewing of pornography—even nonviolent pornography—makes sexual aggression seem less serious (Harris, 1994). In one experiment, undergraduates viewed six brief films each week for six weeks (Zillmann & Bryant, 1984). Some viewed sexually explicit films; others viewed films with no sexual content. Three weeks later, both groups, after reading a report about a man convicted of raping a female hitchhiker, suggested an appropriate prison term. Compared with sentences recommended by the control group, the sex film viewers recommended terms that were half as long. In other studies that explored pornography's effects on aggression toward relationship partners, pornography consumption predicted both self-reported aggression and participants' willingness to administer laboratory noise blasts to their partner (Lambert et al., 2011; Peter & Valkenburg, 2016).

AP® EXAM TIP

In the hitchhiker experiment described here, can you identify the independent and dependent variables? It's great practice to do this every time you read about an experiment.

Pornography with violent sexual content can increase men's readiness to behave aggressively toward women. A statement by 21 social scientists noted, "Pornography that portrays sexual aggression as pleasurable for the victim increases the acceptance of the use of coercion in sexual relations" (Surgeon General, 1986). Contrary to much popular opinion, viewing such scenes does not provide an outlet for bottled-up impulses. Rather, "in laboratory studies measuring short-term effects, exposure to violent pornography increases punitive behavior toward women."

Do Violent Video Games Teach Social Scripts for Violence?

Experiments worldwide indicate that playing positive games produces positive effects (Greitemeyer & Mügge, 2014; Prot et al., 2014). For example, playing *Lemmings*, where a goal is to help others, increases real-life helping. So, might a parallel effect occur after playing games that enact violence? Violent video games became an issue for public debate after teenagers in more than a dozen places seemed to mimic the carnage in the shooter games they had so often played (Anderson, C. A., 2004, 2013).

In 2002, three young men in Michigan spent part of a night drinking beer and playing *Grand Theft Auto III.* Using simulated cars, they ran down pedestrians, then beat them with fists, leaving a bloody body behind (Kolker, 2002). These same young men then went out for a real drive. Spotting a 38-year-old man on a bicycle, they ran him down with their car, got out, stomped and punched him, and returned home to play the game some more. (The victim, a father of three, died six days later.)

AFP/Getty Images

Coincidence or cause? In 2011, Norwegian Anders Behring Breivik bombed government buildings in Oslo, and then went to a youth camp where he shot and killed 69 people, mostly teens. As a player of first-person shooter games, Breivik stirred debate when he commented that “I see MW2 *[Modern Warfare 2]* more as a part of my training-simulation than anything else.” Did his violent game playing—and that of the 2012 mass murderer of Newtown, Connecticut’s first-grade children—contribute to the violence, or was it a merely coincidental association? To explore such questions, psychologists experiment.

This is but one anecdote, and, as we say in psychological science, “the plural of anecdote is not evidence.” Yet such incidents of violent mimicry make us wonder: What *are* the effects of actively role-playing aggression? Does it cause young people to become less sensitive to violence and more open to violent acts? Nearly 400 studies of 130,000 people offer some answers (Anderson et al., 2010; Calvert et al., 2017): Video games can prime aggressive thoughts, decrease empathy, and increase aggression. University men who spend the most hours playing violent video games have also tended to be the most physically aggressive (Anderson & Dill, 2000). (For example, they more often acknowledged having hit or attacked someone else.) And people randomly assigned to play a game involving bloody murders with groaning victims (rather than to play nonviolent *Myst*) became more hostile. On a follow-up task, they were more likely to blast intense noise at a fellow student. Studies of young adolescents reveal that those who play a lot of violent video games become more aggressive and see the world as more hostile (Bushman, 2016; Exelmans et al., 2015; Gentile, 2009). Compared with nongaming kids, they get into more arguments and fights and earn poorer grades.

Ah, but is this merely because naturally hostile kids are drawn to such games? Apparently not. Comparisons of gamers and nongamers who scored low on hostility measures revealed a difference in the number of fights they reported. Almost 4 in 10 violent-game players had been in fights, compared with only 4 in 100 of the nongaming kids (Anderson, C. A., 2004). Some researchers believe that, due partly to the more active participation and rewarded violence of game play, violent video games have even greater effects on aggressive behavior and cognition than do violent TV shows and movies (Anderson & Warburton, 2012).

> “ *Research demonstrates a consistent relation between violent video game use and increases in aggressive behavior, aggressive cognitions and aggressive affect, and*

> *decreases in prosocial behavior, empathy and sensitivity to aggression.*”
>
> *American Psychological Association Task Force on Violent Media, 2015*

Other researchers are unimpressed by such findings (Ferguson, 2013, 2014, 2015). They note that from 1996 to 2006, video game sales increased yet youth violence declined. They argue that other factors—depression, family violence, peer influence—better predict aggression. The focused fun of game playing can also satisfy basic needs for a sense of competence, control, and social connection (Granic et al., 2014).

* * *

To sum up, research reveals biological, psychological, and social-cultural influences on aggressive behavior. Complex behaviors, including violence, have many causes, making any single explanation an oversimplification. Asking what causes violence is therefore like asking what causes cancer. Those who study the effects of asbestos exposure on cancer rates may remind us that asbestos is indeed a cancer cause, but it is only one among many. Like so much else, aggression is a biopsychosocial phenomenon (**Figure 78.2**).

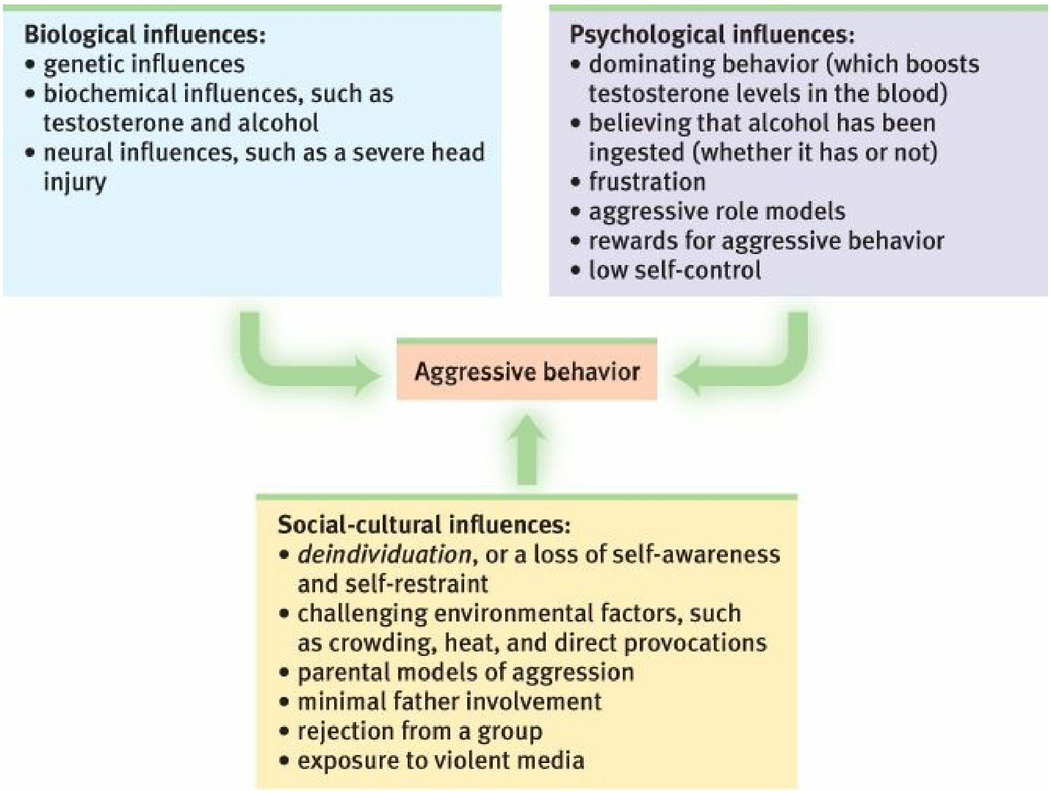

Biological influences:
• genetic influences
• biochemical influences, such as testosterone and alcohol
• neural influences, such as a severe head injury
Psychological influences:
• dominating behavior (which boosts testosterone levels in the blood)
• believing that alcohol has been ingested (whether it has or not)
• frustration
• aggressive role models
• rewards for aggressive behavior
• low self-control
Aggressive behavior
Social-cultural influences:
• *deindividuation*, or a loss of self-awareness and self-restraint
• challenging environmental factors, such as crowding, heat, and direct provocations
• parental models of aggression
• minimal father involvement
• rejection from a group
• exposure to violent media

Figure 78.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 78.2 Biopsychosocial understanding of aggression

Because many factors contribute to aggressive behavior, there are many ways to change such behavior, including learning anger management and communication skills, and avoiding violent media and video games.

A happy concluding note: Historical trends suggest that the world is becoming less violent over time (Pinker, 2011). That people vary across time and place reminds us that environments differ. Yesterday's plundering Vikings have become today's peace-promoting Scandinavians. Like all behavior, aggression arises from the interaction of persons and situations.

✓ Check Your Understanding

Ask Yourself

- Do you think there should be laws to prevent children's exposure to violent media? Why or why not?

Test Yourself

- What psychological, biological, and social-cultural influences interact to produce aggressive behaviors?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 78 REVIEW

78-1 How does psychology's definition of *aggression* differ from everyday usage? What biological factors make us more prone to hurt one another?

- In psychology's more specific meaning, *aggression* is any act intended to harm someone physically or emotionally.
- Biology influences our threshold for aggressive behaviors at three levels: genetic (inherited traits), neural (activity in key brain areas), and biochemical (such as alcohol or excess testosterone in the bloodstream).
- Aggression is a complex behavior resulting from the interaction of biology and experience.

78-2 What psychological and social-cultural factors may trigger aggressive behavior?

- Frustration (*the frustration-aggression principle*), previous reinforcement for aggressive behavior, observing an aggressive role model, and poor self-control can all contribute to aggression.
- Media portrayals of violence provide *social scripts* that children learn to follow.
- Viewing sexual violence contributes to greater aggression toward women.
- Playing violent video games increases aggressive thoughts, emotions, and behaviors.

Multiple-Choice Questions

1. Brandt's football team just barely lost the state championship game after a questionable referee call. As a result, Brandt gets angry and starts shouting insults. Which of the following terms best identifies this chain of events?

   a. Aggression
   b. Biochemical influences
   c. Frustration-aggression principle
   d. Social scripts
   e. Biopsychosocial model

2. Dwayne is acting violently toward his friends and family. A PET scan of his brain may show

   a. increased frontal lobe activity.
   b. diminished activity in the amygdala.
   c. decreased frontal lobe activity.
   d. a decrease in the size of the hippocampus.
   e. enlarged ventricles.

3. Which of the following is an example of a social-cultural influence on aggressive behavior?

   a. Reading an anxiety-provoking novel
   b. Frustration
   c. Testosterone
   d. Exposure to violent media
   e. Genetics

Practice FRQs

1. Using the biopsychosocial model, name a biological influence, a social-cultural influence, and a psychological influence on aggressive behavior.

Answer

1 point: Possible biological influences: genetic, biochemical (for example, testosterone), or neural (for example, severe frontal lobe injury). Page 801

1 point: Possible social-cultural influences: deindividuation, provocation, minimal father involvement, exposure to violent media, rejection from a group, or parental models of aggression. Page 803

1 point: Possible psychological influences: dominating behavior, believing one has consumed alcohol, low self-control, frustration, aggressive role models, or rewards for aggressive behavior. Page 803

2. Explain how social scripts and the frustration-aggression principle can be linked to an increase in violence after viewing violence.

(2 points)

Module **79 Attraction**

LEARNING TARGETS

- **79-1 Explain why we befriend or fall in love with some people but not others.**
- **79-2 Describe how romantic love typically changes as time passes.**

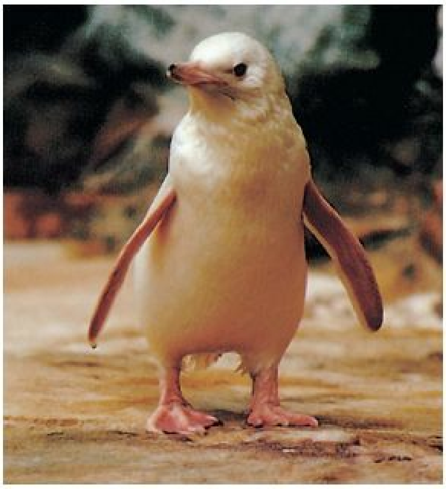
As social animals—as people who need people—we often approach people not with closed fists, but with open arms. Social psychologists focus not only on the dark side of social relationships, but also on the bright side, by studying *prosocial* behavior—behavior that intends to help or benefit someone. Our positive behaviors toward others are evident from explorations of this module’s focus, attraction, and those of the next module, altruism and peacemaking.

Pause a moment and think about your relationships with two people—a close friend, and someone who has stirred your romantic feelings. What psychological chemistry binds us together in friendship or love? Social psychology suggests some answers.

The Psychology of Attraction

79-1 Why do we befriend or fall in love with some people but not others?

We endlessly wonder how we can win others' affection and what makes our own affections flourish or fade. Does familiarity breed contempt, or does it amplify affection? Do birds of a feather flock together, or do opposites attract? Is it what's inside that counts, or does physical attractiveness matter too? To explore these questions, let's consider three ingredients of our liking for one another: proximity, attractiveness, and similarity.



Brendan Beirne/REX/Shutterstock

Familiarity breeds acceptance When this rare white penguin was born in the Sydney, Australia zoo, his tuxedoed peers ostracized him. Zookeepers thought they would need to dye him black to gain acceptance. But after three weeks of contact, the other penguins came to accept him.

Proximity

Before friendships become close, they must begin. *Proximity*—geographic nearness—is friendship's most powerful predictor. Proximity can provide opportunities for aggression. But much more often it breeds liking (and sometimes even marriage) among those who live in the same neighborhood, sit nearby in class, work in the same office, share the same parking lot, or eat in the same cafeteria. Look around. Matching starts with meeting.

Proximity breeds liking partly because of the **mere exposure effect**. Repeated exposure to novel stimuli increases our liking for them. By age 3 months, infants prefer photos of the race they most often see—usually their own race (Kelly et al., 2007). For our ancestors, this mere exposure effect likely had survival value. What was familiar was generally safe and approachable. What was unfamiliar was more often dangerous and threatening. Evolution may therefore have hard-wired into us the tendency to bond with those who are familiar and to be wary of those whose looks are unfamiliar (Sofer et al., 2015; Zajonc, 1998).

mere exposure effect

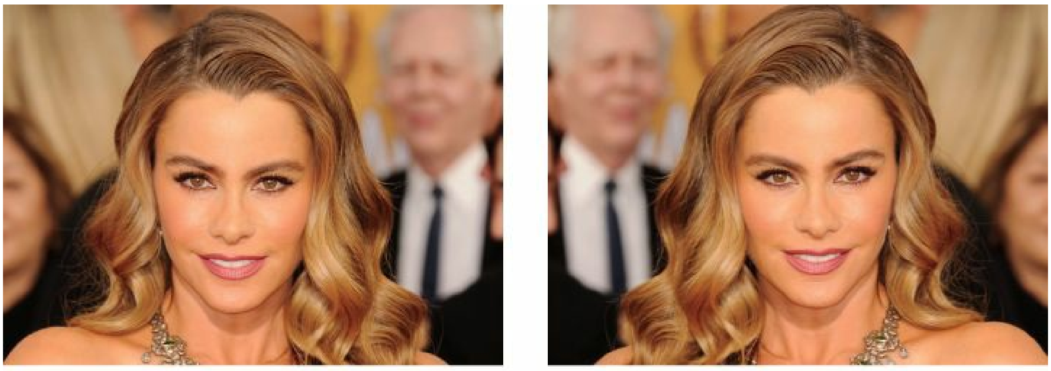
the phenomenon that repeated exposure to novel stimuli increases liking of them.

Mere exposure increases our liking not only for familiar faces, but also for nonsense syllables, musical selections, geometric figures, Chinese characters, and the letters of our own name (Moreland & Zajonc, 1982; Nuttin, 1987; Zajonc, 2001). So, within certain limits, familiarity feeds fondness (Bornstein, 1989, 1999). This would come as no surprise to the young Taiwanese man who wrote more than 700 letters to his girlfriend, urging her to marry him. She did marry—the mail carrier (Steinberg, 1993).

AP® EXAM TIP

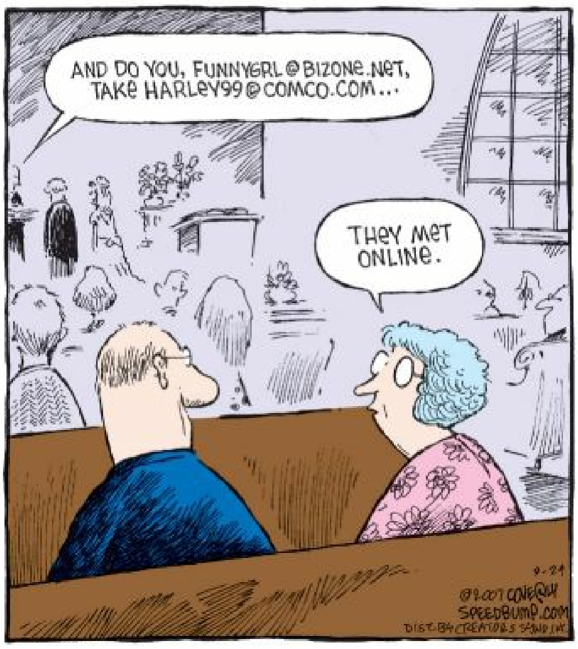
Can you remember the other use of the term *proximity* earlier in the course? It's one of the Gestalt principles from Unit IV.

No face is more familiar than your own. And that helps explain an interesting finding by Lisa DeBruine (2002, 2004): We like other people when their faces incorporate some morphed features of our own. When McMaster University students played a game with a supposed other player, they were more trusting and cooperative when the other person's image had some of their own facial features morphed into it. In me I trust.



Jeffrey Mayer/Getty Images

Which is the real Sofía Vergara? The mere exposure effect applies even to ourselves. Because the human face is not perfectly symmetrical, the face we see in the mirror is not the same face our friends see. Most of us prefer the familiar mirror image, while our friends like the reverse (Mita et al., 1977). The person actress Sofía Vergara sees in the mirror each morning is shown at right, and that's the photo she would probably prefer.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Modern Matchmaking

Adults who have not found a romantic partner in their immediate proximity may cast a wider net by joining an online dating service.

Millions search for love on one of the 8000 online dating services (Hatfield, 2016). In 2015, 27 percent of 18- to 24-year-old Americans tried an online dating service or mobile dating app (Smith, 2016).

Online matchmaking definitely expands the pool of potential mates (Finkel et al., 2012a,b). But how effective is the matchmaking? Compared with those formed in person, Internet-formed friendships and romantic relationships are, on average, slightly more likely to last and be satisfying (Bargh & McKenna, 2004; Cacioppo et al., 2013). In one study, people disclosed more, with less posturing, to those whom they met online (McKenna et al., 2002). When conversing online with someone for 20 minutes, they felt more liking for that person than they did for someone they had met and talked with face-to-face. This was true even when (unknown to them) it was the same person! Internet friendships often feel as real and important as in-person relationships.

Small wonder that one survey found a leading online matchmaker enabling more than 500 U.S. marriages a day (Harris Interactive, 2010). By one estimate, online dating now is responsible for about a fifth of U.S. marriages (Crosier et al., 2012). And in a national survey of straight and gay/lesbian couples, nearly a quarter of heterosexual couples and some two-thirds of same-sex couples met online (Rosenfeld & Thomas, 2012; see **Figure 79.1**).

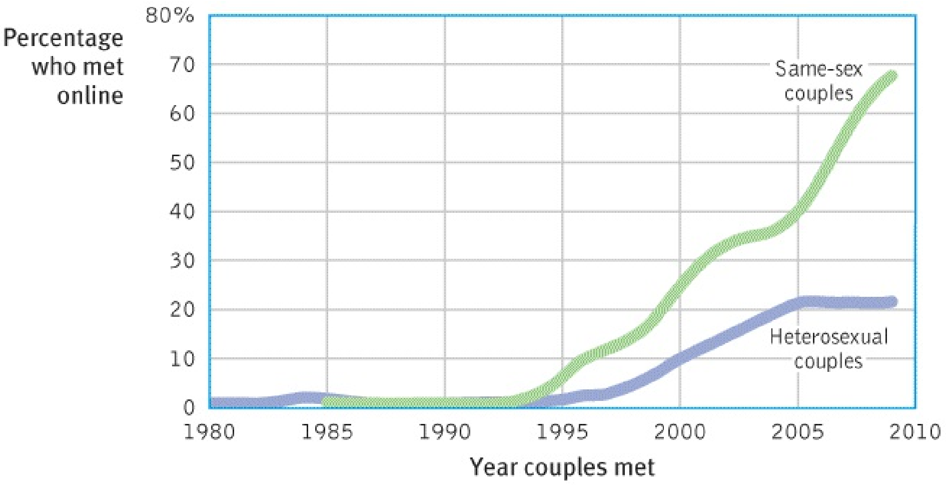


Figure 79.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Rosenfeld & Thomas, 2012.

Figure 79.1 Percentage of heterosexual and same-sex couples

who met online

Speed dating pushes the search for romance into high gear. In a process pioneered by a matchmaking Jewish rabbi, people meet a succession of prospective partners, either in person or via webcam (Bower, 2009). After a 3- to 8-minute conversation, people move on to the next prospect. (In an in-person heterosexual meeting, one group—usually the women—remains seated while the other group circulates.) Those who want to meet again can arrange for future contact. For many participants, 4 minutes is enough time to form a feeling about a conversational partner and to register whether the partner likes them (Eastwick & Finkel, 2008a,b).

For researchers, speed dating offers a unique opportunity for studying influences on our first impressions of potential romantic partners. Some recent findings:

- *People who fear rejection often elicit rejection.* After a 3-minute speed date, those who most feared rejection were least often selected for a follow-up date (McClure & Lydon, 2014).
- *Given more options, people make more superficial choices.* When people meet lots of potential partners, they focus on more easily assessed characteristics, such as height and weight (Lenton & Francesconi, 2010).
- *Men wish for future contact with more of their speed dates; women tend to be choosier.* But this difference disappears if the conventional roles are reversed, so that men stay seated while women circulate (Finkel & Eastwick, 2009).

Physical Attractiveness

Once proximity affords us contact, what most affects our first impressions? The person’s sincerity? Intelligence? Personality? Hundreds of experiments reveal that it is something more superficial: physical appearance. This finding is unnerving for those of us taught that “beauty is only skin deep” and “appearances can be deceiving.”

FYI

Percentage of Men and Women Who "Constantly Think About Their Looks"

	Men	Women
Canada	18%	20%
United States	17	27
Mexico	40	45
Venezuela	47	65

From Roper Starch survey, reported by McCool (1999).

In one early study, researchers randomly matched new University of Minnesota students for a Welcome Week dance (Walster et al., 1966). Before the dance, the researchers gave each student a battery of personality and aptitude tests, and they rated each student's physical attractiveness. During the blind date, the couples danced and talked for more than two hours and then took a brief intermission to rate their dates. What predicted whether they liked each other? Only one thing: appearance. Both the men and the women liked good-looking dates best. Women are more likely than men to say that another's looks don't affect them (Lippa, 2007). But studies show that a man's looks do affect women's behavior (Eastwick et al., 2014a,b). In speed-dating experiments, attractiveness influences first impressions for both sexes (Belot & Francesconi, 2006; Finkel & Eastwick, 2008).

Physical attractiveness also predicts how often people date and how popular they feel. And it affects initial impressions of people's personalities. We don't assume that attractive people are more compassionate, but we do perceive them as healthier, happier, more sensitive, more successful, and more socially skilled (Eagly et al., 1991; Feingold, 1992; Hatfield & Sprecher, 1986).

FYI

Estimated length of human nose removed by U.S. plastic surgeons each year: 5469 feet (Harper's, 2009).

For those of us who find the importance of looks unfair and unenlightened, three other findings may be reassuring.

- People's attractiveness is surprisingly unrelated to their self-esteem and happiness (Diener et al., 1995; Major et al., 1984). Unless we have just compared ourselves with superattractive people, few of us (thanks, perhaps, to the mere exposure effect) view ourselves as unattractive (Thornton & Moore, 1993).
- Strikingly attractive people are sometimes suspicious that praise for their work may simply be a reaction to their looks. Less attractive people have been more likely to accept praise as sincere (Berscheid, 1981).
- For couples who were friends before lovers—who became romantically involved long after first meeting—looks matter less (Hunt et al., 2015). With slow-cooked love, shared values and interests matter more.

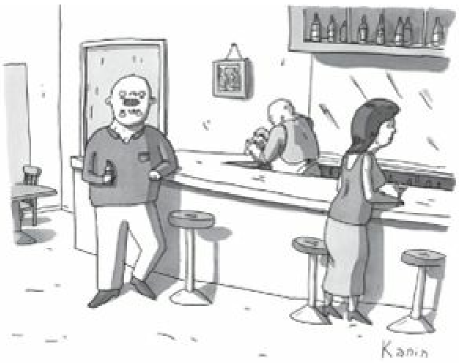
FYI

Women have 91 percent of cosmetic procedures (ASPS, 2010). Women also recall others' appearance better than do men (Mast & Hall, 2006).

Beauty is also in the eye of the culture. Hoping to look attractive, people across the globe have pierced and tattooed their bodies, lengthened their necks, bound their feet, and artificially lightened or darkened their skin and hair. They have gorged themselves to achieve a full figure or liposuctioned fat to achieve a slim one, applied chemicals to rid themselves of unwanted hair or to regrow wanted hair, strapped on leather garments to make their breasts seem smaller or relied on push-up bras and surgery to make them look bigger. Cultural ideals change over time. For women in North America, the ultra-thin ideal of the Roaring Twenties gave way to the soft, voluptuous Marilyn Monroe ideal of the 1950s, only to be replaced by today's lean yet busty ideal.

Left: Sean Caffrey/Getty Images; Center: Blend Images/Alamy; Right: svetikd/Getty Images

In the eye of the beholder Conceptions of attractiveness vary by culture and over time. Yet some adult physical features, such as a healthy appearance and a relatively symmetrical face, seem attractive everywhere.



Zachary Kanin The New Yorker Collection
/The Cartoon Bank

“Play coy if you like, but no one can resist a perfectly symmetrical face.”

Some aspects of heterosexual attractiveness, however, do cross place and time (Cunningham et al., 2005; Langlois et al., 2000). By providing reproductive clues, bodies influence sexual attraction. As evolutionary psychologists explain (Module 15), men in many cultures, from Australia to Zambia, judge women as more attractive if they have a youthful, fertile appearance, suggested by a low waist-to-hip ratio (Karremans et al., 2010; Perilloux et al., 2010; Platek & Singh, 2010). Women feel attracted to healthy-looking men, but especially—and more so when ovulating—to those who seem mature, dominant, masculine, and affluent (Gallup & Frederick, 2010; Gangestad et al., 2010).

Faces matter, too. When people rate opposite-sex faces and bodies separately, the face tends to be the better predictor of overall physical attractiveness (Currie & Little, 2009; Peters et al., 2007). So what makes a face attractive? Part of the answer is features that are neither unusually large nor small. Symmetrical faces and bodies are also perceived as more sexually attractive (Rhodes et al., 1999; Singh, 1995; Thornhill & Gangestad, 1994). This helps explain why an averaged (and therefore symmetrical) face is attractive (**Figure 79.2**). In one clever demonstration, researchers digitized the faces of up to 32 college students and used a computer to average them (Langlois & Roggman, 1990). The result? Viewers judged the averaged, composite faces as more attractive than 96 percent of the individual faces. (If only we could merge either half of our face with its mirror image: Our symmetrical new face would be a notch more attractive.)

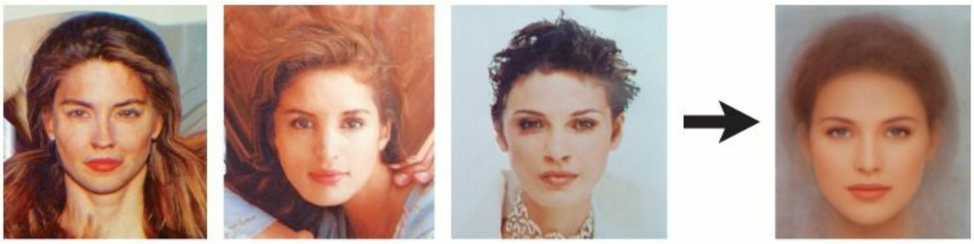


Figure 79.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
David Perrett/University of St. Andrews

Figure 79.2 Average is attractive

Which of these faces offered by University of St. Andrews psychologist David Perrett (2002, 2010) is most attractive? Most people say it's the face on the right—of a nonexistent person that is the average composite of these 3 plus 57 other actual faces.

Our feelings also influence our attractiveness judgments. Imagine two people: One is honest, humorous, and polite. The other is rude, unfair, and abusive. Which one is more attractive? Most people perceive the person with the appealing traits as more physically attractive (Lewandowski et al., 2007). Or imagine being paired with a stranger of the sex you find attractive—someone who listens intently to your self-disclosures. Might you feel a twinge of sexual attraction toward that empathic person? Student volunteers did, in several experiments (Birnbaum & Reis, 2012). Our feelings influence our perceptions. Those we like we find attractive.

In a Rodgers and Hammerstein musical, Prince Charming asks

Cinderella, “Do I love you because you’re beautiful, or are you beautiful because I love you?” Chances are it’s both. As we see our loved ones again and again, their physical imperfections grow less noticeable and their attractiveness grows more apparent (Beaman & Klentz, 1983; Gross & Crofton, 1977). Shakespeare said it in *A Midsummer Night’s Dream*: “Love looks not with the eyes, but with the mind.” Come to love someone and watch beauty grow. Love sees loveliness.

Similarity

So proximity has brought you into contact with someone, and your appearance has made an acceptable first impression. What influences whether you will become friends? As you get to know each other, will the chemistry be better if you are opposites or if you are alike?

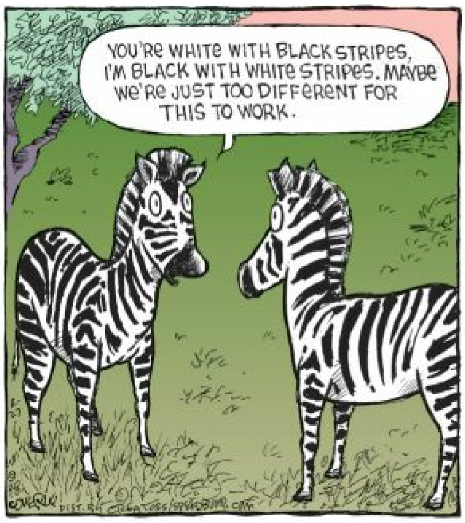
Left: John Shearer/Getty Images; Right: Bennett Raglin/Getty Images

Extreme makeover In affluent, beauty-conscious cultures, increasing numbers of people, such as reality TV star Kylie Jenner, have turned to cosmetic procedures to change their looks.

It makes a good story—extremely different types liking or loving each other: Rat, Mole, and Badger in *The Wind in the Willows*, Frog and Toad in Arnold Lobel’s books, Edward and Bella in the *Twilight* series. The stories delight us by expressing what we seldom experience. In real life, opposites retract (Rosenbaum, 1986; Montoya & Horton, 2013). Compared with randomly paired people, friends and couples are far more likely to share common attitudes, beliefs, and interests (and, for that matter, age, religion, race, education, intelligence, smoking behavior, and economic status). Moreover, the more alike people are, the more their liking endures (Byrne, 1971; Hartl et al., 2015). Journalist Walter

Lippmann was right to suppose that love lasts “when the lovers love many things together, and not merely each other.” Similarity breeds content.

> “*I like the Pope unless the Pope doesn’t like me. Then I don’t like the Pope.*”
>
> *Donald Trump, February 18, 2016*


YOU'RE WHITE WITH BLACK STRIPES, I'M BLACK WITH WHITE STRIPES. MAYBE WE'RE JUST TOO DIFFERENT FOR THIS TO WORK.

© Dave Coverly/speedbump.com

Similarity attracts; perceived dissimilarity does not.

Proximity, attractiveness, and similarity are not the only determinants of attraction. We also like those who like us. This is especially true when our self-image is low. When we believe someone likes us, we feel good and respond to them warmly, which leads them to like us even more (Curtis & Miller, 1986). To be liked is powerfully rewarding.

Indeed, all the findings we have considered so far can be explained by a simple *reward theory of attraction:* We will like those whose behavior is rewarding to us, including those who are both able and willing to help us achieve our goals (Montoya & Horton, 2014). When people live or work in close proximity to us, it requires less time and effort to develop the friendship and enjoy its benefits. When people are attractive, they are aesthetically pleasing, and associating with them can be socially rewarding. When people share our views, they reward us by validating our beliefs.

Check Your Understanding

Ask Yourself

- Think of your closest friends. What factors led to your getting to know them, and to liking them more and more?

Test Yourself

- People tend to marry someone who lives or works nearby. This is an example of the ________________ ________________ ________________ in action.
- How does being physically attractive influence others' perceptions?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Romantic Love

79-2 How does romantic love typically change as time passes?

Sometimes people move quickly from initial impressions, to friendship, to the more intense, complex, and mysterious state of romantic love. If love endures, temporary *passionate love* will mellow into a lingering *companionate love* (Hatfield, 1988).

Passionate Love

Passionate love mixes something new with something positive (Aron et al., 2000; Coulter & Malouff, 2013). We intensely desire to be with our partner (Hatfield et al., 2015). Seeing our partner stimulates blood flow to a brain region linked to craving and obsession (Acevedo et al., 2012).

passionate love

an aroused state of intense positive absorption in another, usually present at the beginning of a romantic relationship.

The two-factor theory of emotion (Module 41) explains the intense positive absorption of romantic love (Hatfield, 1988). That theory assumes that

- emotions have two ingredients—*physical arousal* plus *cognitive appraisal.*
- arousal from any source can enhance one emotion or another, depending on how we interpret and label the arousal.

In tests of the two-factor theory, college men have been aroused by fright, by running in place, by viewing erotic materials, or by listening to humorous or repulsive monologues. They were then introduced to an attractive woman and asked to rate her (or their girlfriend). Unlike unaroused men, the stirred-up men attributed some of their arousal to the woman or girlfriend, and felt more attracted to her (Carducci et al., 1978; Dermer & Pyszczynski, 1978; White & Kight, 1984). In one classic experiment, researchers studied people crossing two bridges above British Columbia's rocky Capilano River (Dutton & Aron, 1974, 1989). One, a swaying footbridge, was 230 feet above the rocks; the other was low and solid. As men came off each bridge, an attractive young woman (working for the researchers) intercepted them and asked them to fill out a short questionnaire. She then offered her phone number in case they wanted to hear more about her project. Far more of the men who had just crossed the high bridge—which left their hearts pounding—accepted the number and later called the woman.

To be revved up and to associate some of that arousal with a desirable person is to feel the pull of passion. Adrenaline makes the heart grow fonder. Sexual desire + a growing attachment = passionate love (Berscheid, 2010).

Companionate Love

Although the desire and attachment of romantic love often endure, the intense absorption in the other, the thrill of the romance, the giddy "floating on a cloud" feelings typically fade. Does this mean the French are correct in saying that "love makes the time pass and time makes love pass"? Or can friendship and commitment keep a relationship going after the passion cools?

As love matures, it typically becomes a steadier **companionate love**—a deep, affectionate attachment (Hatfield, 1988). Like a passing storm, the flood of passion-facilitating hormones (testosterone, dopamine, adrenaline) subsides. But another hormone, *oxytocin,* remains, supporting feelings of trust, calmness, and bonding with the mate. This shift from passion to attachment may have adaptive value (Reis & Aron, 2008). Passionate love often produces children, whose survival is aided by the parents' waning obsession with each other.

companionate love

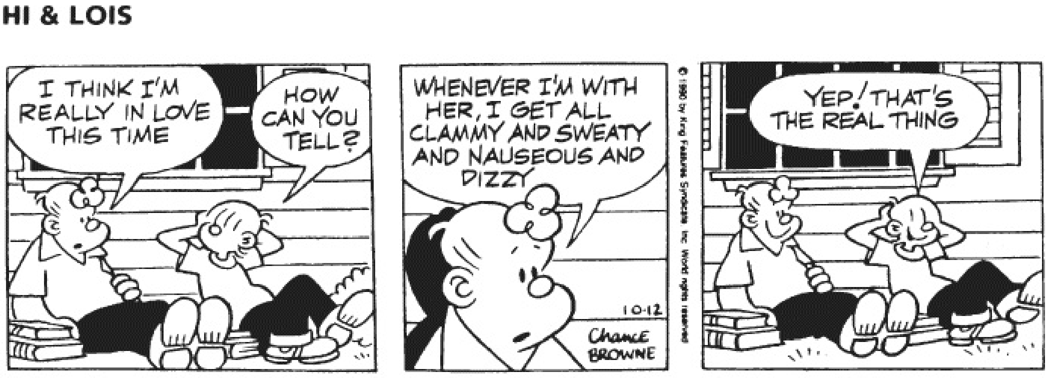
the deep affectionate attachment we feel for those with whom our lives are intertwined.

In the most satisfying marriages, attraction and sexual desire endure, minus the obsession of early stage romance (Acevedo & Aron, 2009). Indeed, failure to appreciate passionate love's limited half-life can doom a relationship (Berscheid et al., 1984). Recognizing the short duration of obsessive passionate love, some societies deem such feelings an irrational reason for marrying. Better, they say, to search for (or have someone choose for you) a partner with a compatible background and interests. Non-Western cultures, where people rate love as less important for marriage, do have lower divorce rates (Levine et al., 1995).

One key to a gratifying and enduring relationship is **equity**. When equity exists—when both partners receive in proportion to what they give—their chances for sustained and satisfying companionate love have been good (Gray-Little & Burks, 1983; Van Yperen & Buunk, 1990). In one national survey, "sharing household chores" ranked third, after "faithfulness" and a "happy sexual relationship," on a list of nine things people associated with successful marriages. As the Pew Research Center (2007) summarized, "I like hugs. I like kisses. But what I really love is help with the dishes."

equity

a condition in which people receive from a relationship in proportion to what they give to it.


HI & LOIS
I THINK I'M REALLY IN LOVE THIS TIME
HOW CAN YOU TELL?
WHENEVER I'M WITH HER, I GET ALL CLAMMY AND SWEATY AND NAUSEOUS AND DIZZY
10-12
Chance BROWNE
© 1990 by King Features Syndicate, Inc. World rights reserved
YEP! THAT'S THE REAL THING

HI & LOIS © 1990 by King Features Syndicate, Inc.

Equity's importance extends beyond marriage. Mutually sharing one's self and possessions, making decisions together, giving and getting emotional support, promoting and caring about each other's welfare—all of these acts are at the core of every type of loving relationship (Sternberg & Grajek, 1984). It's true for lovers, for parent and child, and for close friends.

Sharing includes **self-disclosure**, revealing intimate details about ourselves—our likes and dislikes, our dreams and worries, our proud and shameful moments. "When I am with my friend," noted the Roman statesman Seneca, "me thinks I am alone, and as much at liberty to speak anything as to think it." Self-disclosure breeds liking, and liking breeds self-disclosure (Collins & Miller, 1994). As one person reveals a little, the other reciprocates, the first then reveals more, and on and on, as friends or lovers move to deeper levels of intimacy (Baumeister & Bratslavsky, 1999).

self-disclosure

the act of revealing intimate aspects of ourselves to others.

2430/Getty Images

Love is an ancient thing This 5000- to 6000-year-old “Romeo and Juliet” young couple was unearthed locked in embrace, near Rome.

One experiment marched some student pairs through 45 minutes of increasingly self-disclosing conversation—from “What is the greatest accomplishment of your life?” to “When did you last cry in front of another person? By yourself?” Other pairs spent the time with small-talk questions, such as “What was your high school like?” (Aron et al., 1997). By the experiment’s end, those experiencing the escalating intimacy felt much closer to their conversation partner than did the small-talkers. Likewise, after dating couples spent 45 minutes answering such questions, they felt increased love (Welker et al., 2014).

In addition to equity and self-disclosure, a third key to enduring love is *positive support*. Relationship conflicts are inevitable, but hurtful communications are not. Do we more often express sarcasm or support, scorn or sympathy, sneers or smiles? For unhappy couples, disagreements, criticisms, and put downs are routine. For happy couples in enduring relationships, positive interactions (compliments, touches, laughing) outnumber negative interactions (sarcasm, disapproval, insults) by at least 5 to 1 (Gottman, 2007; see also Sullivan et al., 2010).

In the mathematics of love, self-disclosing intimacy + mutually supportive equity = enduring companionate love.

Check Your Understanding

Ask Yourself

- When you think of some of the older couples you know, which ones seem to experience companionate love? How do you think they've achieved it?

Test Yourself

- How does the two-factor theory of emotion help explain *passionate love?*
- Two vital components for maintaining companionate love are _______________ and _______________-_______________.

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 79 REVIEW

79-1 Why do we befriend or fall in love with some people but not others?

- Proximity (geographical nearness) increases liking, in part because of the *mere exposure effect*—exposure to novel stimuli increases liking of those stimuli.
- Physical attractiveness increases social opportunities and improves the way we are perceived.
- Similarity of attitudes and interests greatly increases liking, especially as relationships develop. We also like those who like us.

79-2 How does romantic love typically change as time passes?

- Intimate love relationships start with *passionate love*—an intensely aroused state.
- Over time, the strong affection of *companionate love* may develop, especially if enhanced by an *equitable* relationship, by intimate *self-disclosure*, and positive support.

Multiple-Choice Questions

1. Which of the following terms describes our geographic nearness to another person?

a. Mere exposure effect
b. Proximity
c. Similarity
d. Intimacy
e. Symmetry

2. Which of the following is an example of the mere exposure effect?

a. Adrianna has started arriving tardy to her second period class to avoid a group of kids in the hall who constantly tease her.

b. Abe has biked the same route to school so many times that he no longer has to think about where to turn.
c. Daiyu has seen the same toothpaste ad on television a hundred times. Each time she sees it she hates it more.
d. Abdul has always loved dogs, so he adopted one from the local shelter.
e. Guiren didn’t like sushi the first couple of times he tried it, but his friend encouraged him to keep eating it and now it’s one of his favorite foods.

3. Lisa and Nate are on their first date at a local restaurant. Which of the following is the best predictor of whether they will have a second date?

a. How physically attractive they find each other
b. If they both have successful careers
c. If they are of the same religion
d. If they met using an online dating service
e. If they have a shared desire to have children one day

4. Over time,

a. passionate and companionate love both decrease.
b. passionate love increases and companionate love decreases.
c. passionate and companionate love both increase.
d. passionate love decreases and companionate love increases.
e. there is no consistent relationship between the levels of passionate love and companionate love.

Practice FRQs

1. Describe one key factor present in passionate love and two key factors present in companionate love.

Answer

1 point: Physical arousal is the key factor that accompanies passionate love. [Page 812](#)

1 point: Equity—when people receive from a relationship in proportion to what they put into it—is one key component of companionate love. [Page 813](#)

1 point: Self-disclosure—revealing intimate aspects of yourself to others—is another key component of companionate love. [Page 814](#)

2. Matt has just finished a five-mile run with his new friend Janelle. How might the following influence him to ask her for a date?

- Similarity
- Two-factor theory of emotion
- Proximity

(3 points)

Module **80 Altruism, Conflict, and Peacemaking**

LEARNING TARGETS

- 80-1 Define *altruism*, and describe when people are most—and least—likely to help.
- 80-2 Discuss how social exchange theory and social norms explain helping behavior.
- 80-3 Explain how social traps and mirror-image perceptions fuel social conflict.
- 80-4 Discuss how we can promote peace.

Altruism

80-1 What is *altruism?* When are people most—and least—likely to help?

Altruism is an unselfish concern for the welfare of others. In rescuing his jailer, Dirk Willems (who we met in Unit XIV's beginning) exemplified altruism. Willems fits the definition of a *hero*—moral, courageous, and protective of those in need (Kinsella et al., 2015). Carl Wilkens and Paul Rusesabagina displayed another heroic example of altruism in Kigali, Rwanda. Wilkens, a Seventh-day Adventist missionary, was living there in 1994 with his family when militia from the Hutu ethnic group began to slaughter members of a minority ethnic group, the Tutsis. The U.S. government, church leaders, and friends all implored Wilkens to leave. He refused. After evacuating his family, and after every other American had left Kigali, he alone stayed and contested the 800,000-person genocide. When the militia came to kill him and his Tutsi servants, Wilkens' Hutu neighbors deterred them. Despite repeated death threats, he spent his days running roadblocks to take food and water to orphanages and to negotiate, plead, and bully his way through the bloodshed, saving lives time and again. "It just seemed the right thing to do," he later explained (Kristof, 2004).

altruism

unselfish regard for the welfare of others.

Elsewhere in Kigali, Rusesabagina, a Hutu married to a Tutsi and the acting manager of a luxury hotel, was sheltering more than 1200 terrified Tutsis and moderate Hutus. When international peacekeepers abandoned the city and hostile militia threatened his guests in the "Hotel Rwanda" (as it came to be called in a 2004 movie), the courageous Rusesabagina began cashing in past favors. He bribed the militia and telephoned influential people abroad to exert pressure on local authorities, thereby sparing the lives of the hotel's occupants, despite the surrounding chaos. Both Wilkens and Rusesabagina were displaying altruism, an unselfish regard for the welfare of others.

> “*Probably no single incident has caused social psychologists to pay as much attention to an aspect of social behavior as Kitty Genovese's murder.*”
>
> *R. Lance Shotland (1984)*

Altruism became a major concern of social psychologists after an especially vile act. On March 13, 1964, a stalker repeatedly stabbed Kitty Genovese, then raped her as she lay dying outside her Queens, New York, apartment at 3:30 A.M. “Oh, my God, he stabbed me!” Genovese screamed into the early morning stillness. “Please help me!” Windows opened and lights went on as some neighbors heard her screams. Her attacker fled and then returned to stab and rape her again. Until it was too late, no one called police or came to her aid.

Bystander Intervention

Although initial reports of the Genovese murder overestimated the number of witnesses, the reports triggered outrage over the bystanders' apparent “apathy” and “indifference.” Rather than blaming the onlookers, social psychologists John Darley and Bibb Latané (1968b) attributed their inaction to an important situational factor—the presence of others. Given certain circumstances, they suspected, most of us might behave similarly. To paraphrase the French writer Voltaire, we all are guilty of the good we did not do.

After staging emergencies under various conditions, Darley and Latané assembled their findings into a decision scheme: We will help only if the situation enables us first to *notice* the incident, then to *interpret* it as an emergency, and finally to *assume responsibility* for helping (**Figure 80.1**). At each step, the presence of others can turn us away from the path that leads to helping.

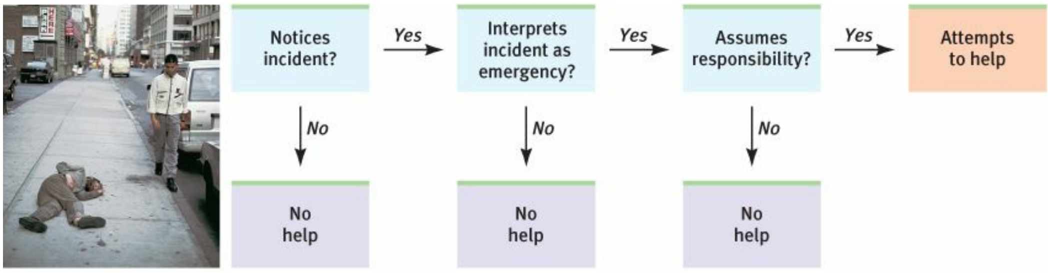


Figure 80.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Photo: © Viviane Moos/CORBIS

Figure 80.1 The decision-making process for bystander intervention

Before helping, one must first notice an emergency, then correctly interpret it, and then feel responsible. (Adapted from Darley & Latané, 1968b.)

One of Darley and Latané's experiments staged a fake emergency as students in separate laboratory rooms took turns talking over an intercom. Only the person whose microphone was switched on could be heard. When his turn came, one student (an accomplice of the experimenters) pretended to have an epileptic seizure, and he called for help (Darley & Latané, 1968a).

How did the others react? As **Figure 80.2** shows, those who believed only they could hear the victim—and therefore thought they alone were responsible for helping him—usually went to his aid. Students who thought others could also hear the victim's cries were more likely to do nothing. When more people shared responsibility for helping—when there was a *diffusion of responsibility*—any single listener was less likely to help. Inattention and diffused responsibility also contribute to the "global bystander nonintervention" as millions of far-away people die of hunger, disease, and genocide (Pittinsky & Diamante, 2015).

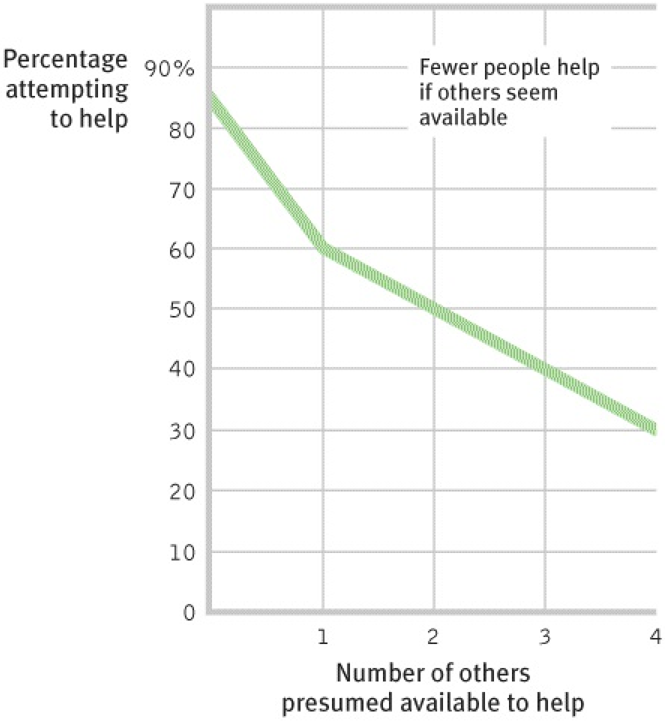


Figure 80.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Darley & Latané, 1968a.

Figure 80.2 Responses to a simulated emergency

When people thought they alone heard the calls for help from a person they believed to be having an epileptic seizure, they usually helped. But when they thought four others were also hearing the calls, fewer than one-third responded.

Hundreds of additional experiments have confirmed this **bystander effect**. For example, researchers and their assistants took 1497 elevator rides in three cities and "accidentally" dropped coins or pencils in front of 4813 fellow passengers (Latané & Dabbs, 1975). When alone with the person in need, 40 percent helped; in the presence of 5 other bystanders, only 20 percent helped. The presence of bystanders reduces brain activation in the motor cortex, signaling that we don't need to take action (Hortenhuis & de Gelder, 2014).

bystander effect

the tendency for any given bystander to be less likely to give aid if other bystanders are present.

Observations of behavior in thousands of these situations—relaying an emergency phone call, aiding a stranded motorist, donating blood, picking up dropped books, contributing money, giving time—show that the odds of our helping someone depend on the characteristics of the person, the situation, and our own internal state. The odds of helping are highest when

- the person appears to need and deserve help.
- the person is in some way similar to us.
- the person is a woman.
- we have just observed someone else being helpful.
- we are not in a hurry.
- we are in a small town or rural area.
- we are feeling guilty.
- we are focused on others and not preoccupied.
- we are in a good mood.

PLEASE GIVE TO ALTRUISM RESEARCH
Nick Downes

© 2006 Nick Downes

This last result, that happy people are helpful people, is one of psychology’s most consistent findings. As poet Robert Browning (1868) observed, “Oh, make us happy and you make us good!” It doesn’t matter how we are cheered. Whether by being made to feel successful and intelligent, by thinking happy thoughts, by finding money, or even by receiving a posthypnotic suggestion, we become more generous and more eager to help (Carlson et al., 1988). And if our feeling of elevation follows witnessing or learning of someone else's self-giving deed, our helping will become even more pronounced (Schnall et al., 2010).

So happiness breeds helpfulness. But it's also true that helpfulness breeds happiness. Helping those in need activates brain areas associated with reward (Harbaugh et al., 2007; Kawamichi et al., 2015). That helps explain a curious finding: People who give money away are happier than those who spend it almost entirely on themselves. In one controlled experiment, researchers gave people an envelope with cash and instructed one group to spend it on themselves and another to spend it on others (Dunn et al., 2008; Dunn & Norton, 2013). Which group was happiest at the day's end? It was, indeed, those assigned to the spend-it-on-others condition. And in a survey of more than 200,000 people worldwide, people in both rich and poor countries were happier with their lives if they had donated to a charity in the last month. Just reflecting on an instance of spending money on others provides most people with a mood boost (Aknin et al., 2013).

✓ Check Your Understanding

Ask Yourself

- Imagine being a newcomer needing directions at a busy bus terminal. What could you do to increase the odds that someone would assist you, and what sort of person would be most likely to help?

Test Yourself

- Why didn't anybody help Kitty Genovese? What social psychology principle did this incident illustrate?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Helping—Self-Interest or Socialization?

80-2 How do social exchange theory and social norms explain helping behavior?

Why do we help? One widely held view is that self-interest underlies all human interactions, that our constant goal is to maximize rewards and minimize costs. Accountants call it *cost-benefit analysis*. Philosophers call it *utilitarianism*. Social psychologists call it **social exchange theory**. If you are considering donating blood, you may weigh the costs of doing so (time, discomfort, anxiety) against the benefits (reduced guilt, social approval, good feelings). If the rewards exceed the costs, you will help.

social exchange theory

the theory that our social behavior is an exchange process, the aim of which is to maximize benefits and minimize costs.

Others believe we help because we have been socialized to do so, through norms that prescribe how we *ought* to behave (Everett et al., 2015). Two such norms are the *reciprocity norm* and the *social-responsibility norm:*

The **reciprocity norm** is the expectation that we should return help, not harm, to those who have helped us. In our relations with others of similar status, this norm compels us to give (in favors, gifts, or social invitations) about as much as we receive. Sometimes this means “paying it forward,” as happened in one experiment, when people who were treated generously became more likely to be generous to a stranger (Tsvetkova & Macy, 2014). Returning favors feels good, making the norm of reciprocity a pleasant strategy to help others (Hein et al., 2016).

reciprocity norm

an expectation that people will help, not hurt, those who have helped them.

The reciprocity norm kicked in after Dave Tally, a Tempe, Arizona, homeless man, found $3300 in a backpack that an Arizona State University student had misplaced on his way to buy a used car (Lacey, 2010). Instead of using the cash for much-needed bike repairs, food, and shelter, Tally turned the backpack in to the social service agency where he volunteered. To reciprocate Tally's help, the backpack's owner thanked him with a reward. Hearing about Tally's self-giving deeds, dozens of others also sent him money and job offers.

The **social-responsibility norm** is the expectation that we should help those who need our help—young children and others who cannot give as much as they receive—even if the costs outweigh the benefits. Europeans are most welcoming of asylum seekers who are most vulnerable—those, for example, who have been tortured or have no surviving family (Bansak et al., 2016). Construction worker Wesley Autrey exemplified the social-responsibility norm on January 2, 2007. He and his 6- and 4-year-old daughters were awaiting a New York City subway train when, before them, a man collapsed in a seizure, got up, then stumbled to the platform's edge and fell onto the tracks. With train headlights approaching, "I had to make a split-second decision," Autrey later recalled (Buckley, 2007). His decision, as his girls looked on in horror, was to leap from the platform, push the man off the tracks and into a foot-deep space between them, and lay atop him. As the train screeched to a halt, five cars traveled just above his head, leaving grease on his knit cap. When Autrey cried out, "I've got two daughters up there. Let them know their father is okay," onlookers erupted into applause.

social-responsibility norm

an expectation that people will help those needing their help.

Many world religions encourage their followers to practice the social-responsibility norm, and sometimes this leads to prosocial behavior. Between 2006 and 2008, Gallup polls sampled more than 300,000 people across 140 countries, comparing the “highly religious” (who said religion was important to them and who had attended a religious service in the prior week) to those less religious. The highly religious, despite being poorer, were about 50 percent more likely to report having “donated money to a charity in the last month” and to have volunteered time to an organization (Pelham & Crabtree, 2008).

Nick Brooks/Newsday/AP Photo

Subway hero Wesley Autrey “I don’t feel like I did something spectacular; I just saw someone who needed help.” Five years later, a similar situation occurred when another man was shoved onto subway tracks—but this time, no one helped (Nocera, 2012). Social psychologists have wondered: Under what conditions will people help?

Conflict and Peacemaking

Positive social norms encourage generosity and enable group living. But conflicts often divide us. One response to recent mass migrations has been increasing nationalism and nativism. Moreover, *every day* the world continues to spend almost $5 billion for arms and armies—money that could be used for badly needed housing, nutrition, education, and health care. Knowing that wars begin in human minds, psychologists have wondered: What in the human mind causes destructive conflict? How might the perceived threats of social diversity be replaced by a spirit of cooperation?

Elements of Conflict

80-3 How do social traps and mirror-image perceptions fuel social conflict?

To a social psychologist, a **conflict** is a perceived incompatibility of actions, goals, or ideas. The elements of conflict are much the same, whether partners sparring, political groups feuding, or nations at war. In each situation, conflict may seed positive change, or be a destructive process that can produce unwanted results. Among these processes are *social traps* and *distorted perceptions*.

conflict

a perceived incompatibility of actions, goals, or ideas.

Social Traps

In some situations, pursuing our personal interests also supports our collective well-being. As capitalist Adam Smith wrote in *The Wealth of Nations* (1776), “It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest.” In other situations, we *harm* our collective well-being by pursuing our personal interests. Such situations are **social traps**.

social trap
a situation in which the conflicting parties, by each pursuing their self-interest rather than the good of the group, become caught in mutually destructive behavior.

Researchers have created mini social traps in laboratory games that require two participants to choose between pursuing their immediate self-interest, at others’ expense, versus cooperating for mutual benefits. Many real-life situations similarly pit our individual interests against our communal well-being. Individual fish trawlers reasoned that the fish they took would not threaten the species and that if they didn’t take them, others would anyway. The result: Some fish stocks have been depleted. Ditto for the buffalo hunters of yesterday and the elephant-tusk poachers of today. Individual car owners and home owners reason, “Electric cars are more expensive. Besides, the fuel that I burn in my one car doesn’t noticeably add to the greenhouse gases.” When enough people reason similarly, the collective result threatens disaster—climate change, rising seas, and more extreme weather.

Social traps challenge us to reconcile our right to pursue our personal well-being with our responsibility for the well-being of all. Psychologists have therefore explored ways to convince people to cooperate for their mutual betterment—through agreed-upon *regulations*, through better *communication*, and through promoting *awareness* of our responsibilities toward community, nation, and the whole of humanity (Dawes, 1980; Linder, 1982; Sato, 1987). Given effective regulations, communication, and awareness, people more often cooperate, whether playing a laboratory game or the real game of life.

Enemy Perceptions

Psychologists have noted that those in conflict have a curious tendency to form diabolical images of one another. These distorted images are, ironically, so similar that we call them **mirror-image perceptions**: As we see “them”—as untrustworthy, with evil intentions—so “they” see us. Each demonizes the other. My political party has benevolent motives; the other party is malevolent (Waytz et al., 2014).

mirror-image perceptions

mutual views often held by conflicting people, as when each side sees itself as ethical and peaceful and views the other side as evil and aggressive.

Mirror-image perceptions can often feed a vicious cycle of hostility. If Juan believes Maria is annoyed with him, he may snub her, causing her to act in ways that justify his perception. As with individuals, so with countries. Perceptions can become **self-fulfilling prophecies**—beliefs that confirm themselves by influencing the other country to react in ways that seem to justify them.

self-fulfilling prophecy

a belief that leads to its own fulfillment.

Individuals and nations alike tend to see their own actions as responses to provocation, not as the causes of what happens next. Perceiving themselves as returning tit for tat, they often hit back harder, as University College London volunteers did in one experiment (Shergill et al., 2003). Their task: After feeling pressure on their own finger, they were to use a mechanical device to press on another volunteer’s finger. Although told to reciprocate with the same amount of pressure, they typically responded with about 40 percent more force than they had just experienced. Despite seeking only to respond in kind, their touches soon escalated to hard presses, much as when each child after a fight claims that “I just poked him, but he hit me harder.”

Mirror-image perceptions feed similar cycles of hostility on the world stage. To most people, torture seems more justified when done by “us” rather than “them” (Tarrant et al., 2012). In American media reports, Muslims who kill have been portrayed as fanatical, hateful terrorists, while an American who allegedly killed 16 Afghans was portrayed as stressed out from marriage problems, four tours of duty, and a friend’s having had his leg blown off (Greenwald, 2012).

The point is not that truth must lie midway between two such views (one may be more accurate). The point is that enemy perceptions often form mirror images. Moreover, as enemies change, so do perceptions. In American minds and media, the “bloodthirsty, cruel, treacherous” Japanese of World War II later became our “intelligent, hardworking, self-disciplined, resourceful allies” (Gallup, 1972).

Promoting Peace

80-4 What can we do to promote peace?

How can we make peace? Can contact, cooperation, communication, and conciliation transform the antagonisms fed by prejudice and conflicts into attitudes that promote peace? Research indicates that, in some cases, they can.

Contact

Does it help to put two conflicting parties into close contact? It depends. Negative contact increases *dis*liking (Graf et al., 2014; Paolini et al., 2014). But positive contact—especially noncompetitive contact between parties of equal status, such as fellow store clerks—typically helps. Initially prejudiced co-workers of different races have, in such circumstances, usually come to accept one another. This finding is confirmed by a statistical digest of more than 500 studies of face-to-face contact between majority people and outgroups (such as ethnic minorities, older and LGBTQ people, and people with disabilities). Among the quarter-million people studied across 38 nations, contact has correlated with (and in experiments has led to) more positive attitudes (Al Ramiah &

Hewstone, 2013; Lemmer & Wagner, 2015; Pettigrew & Tropp, 2011). Some examples:

- With cross-racial contact, South Africans' interracial attitudes have moved "into closer alignment" (Dixon et al., 2007; Finchilescu & Tredoux, 2010; Swart et al., 2011).
- Heterosexuals' attitudes toward gay people are influenced not only by *what* they know but also by *whom* they know (Collier et al., 2012; Smith et al., 2009). In surveys, the reason people most often give for becoming more supportive of same-sex marriage is "having friends, family, or acquaintances who are gay or lesbian" (Pew, 2013b). And in the United States, where attitudes toward gays have become more positive, 87 percent of people now say they know someone who is gay (Pew, 2016).
- Friendly contact, say between Blacks and Whites as roommates, improves attitudes toward others of the different race, and even toward other racial groups (Gaither & Sommers, 2013; Tausch et al., 2010).

However, contact is not always enough. In many schools, ethnic groups segregate themselves in lunchrooms, in classrooms, and elsewhere on school grounds (Alexander & Tredoux, 2010; Clack et al., 2005; Schofield, 1986). People in each group often think that they would welcome more contact with the other group, but they assume the other group does not reciprocate the wish (Richeson & Shelton, 2007). "I don't reach out to them, because I don't want to be rebuffed; they don't reach out to me, because they're just not interested." When such mirror-image misperceptions are corrected, friendships may form and prejudices melt.

Cooperation

To see if enemies could overcome their differences, researcher Muzafer Sherif (1966) set a conflict in motion. He separated 22 Oklahoma City boys into two separate camp areas. Then he had the two groups compete for prizes in a series of activities. Before long, each group became intensely proud of itself and hostile to the other group's "sneaky," "smart-alecky stinkers." Food wars broke out. Cabins were ransacked. Fistfights had to be broken up by camp counselors. Brought together, the two groups avoided each other, except to taunt and threaten. Little did they know that within a few days, they would be friends.

> “*You cannot shake hands with a clenched fist.*”
>
> *Indira Gandhi, 1971*

Sherif accomplished this by giving them **superordinate goals**—shared goals that could be achieved only through cooperation. When he arranged for the camp water supply to “fail,” all 22 boys had to work together to restore the water. To rent a movie in those pre-Netflix days, they all had to pool their resources. To move a stalled truck, the boys needed to combine their strength, pulling and pushing together. Having used isolation and competition to make strangers into enemies, Sherif used shared predicaments and goals to turn enemies into friends. What reduced conflict was not mere contact, but *cooperative* contact. Cooperative actions produce positive attitudes.

superordinate goals

shared goals that override differences among people and require their cooperation.

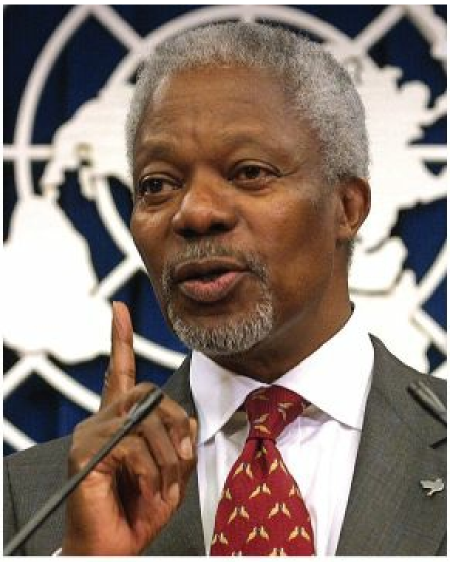
A shared predicament likewise can have a powerfully unifying effect on other groups as well. Children and youth exposed to war, and minority group members facing rejection or discrimination, likewise develop strong ingroup identification (Bauer et al., 2014; Ramos et al., 2012). Israeli children growing up in conflict areas often develop a conflict-supportive narrative of perceptions, beliefs, and emotions regarding their shared adversary (Nasie et al., 2016). Such narratives build ingroup solidarity but also insensitivity to the pain experienced by outgroup members (Levy et al., 2016).

> “*Me against my brother, my brothers and me against my cousins, then my cousins*

and me against strangers.”

Bedouin proverb

In the aftermath of a divisive political primary election, party members will usually reunify when facing their shared threat—the opposition party candidate. At such times, cooperation can lead people to define a new, inclusive group that dissolves their former subgroups (Dovidio & Gaertner, 1999). If this were a social psychology experiment, you might seat members of two groups not on opposite sides, but alternately around a table. Give them a new, shared name. Have them work together. Then watch “us” and “them” become “we.” After 9/11, one 18-year-old New Jersey man described this shift in his own social identity: “I just thought of myself as Black. But now I feel like I’m an American, more than ever” (Sengupta, 2001). In an actual experiment, White Americans who read a newspaper article about a terrorist threat against all Americans subsequently expressed reduced prejudice against Black Americans (Dovidio et al., 2004).



Shawn Baldwin/AP Photo

Kofi Annan “Most of us have overlapping identities which unite us with very different groups. We *can* love what we are, without hating what—and who—we are *not*. We can thrive in our own tradition, even as we learn from others” (Nobel Peace Prize lecture, 2001).

If cooperative contact between rival group members encourages positive attitudes, might this principle bring people together in multicultural schools? Could cooperative learning in classrooms create interracial friendships, while also enhancing student achievement? Experiments with adolescents from 11 countries confirm that the answer is *Yes* (Roseth et al., 2008). In the classroom as in the sports arena, members of interracial groups who work together on projects typically come to feel friendly toward one another. Knowing this, thousands of teachers have made interracial cooperative learning part of their classroom experience.

The power of cooperative activity to make friends of former enemies has led psychologists to urge increased international exchange and cooperation. Some experiments have found that just imagining the shared threat of global climate change reduces international hostilities (Pyszczynski et al., 2012). From adjacent Brazilian tribes to European countries, formerly conflicting groups have managed to build interconnections, interdependence, and a shared social identity as they seek common goals (Fry, 2012). As we engage in mutually beneficial trade, as we work to protect our common destiny on this fragile planet, and as we become more aware that our hopes and fears are shared, we can transform misperceptions that feed conflict into feelings of solidarity based on common interests.

ROCK BRIDGE
10
ROCK BRIDGE
23

Grant Hindsley/AP Photo

Superordinate goals override differences Cooperative efforts to achieve shared goals are an effective way to break down social barriers.

Communication

When real-life conflicts become intense, a third-party mediator—a marriage counselor, labor mediator, diplomat, community volunteer—may facilitate much-needed communication (Rubin et al., 1994). Mediators help each party voice its viewpoint and understand the other's needs and goals. If successful, mediators can replace a competitive *win-lose* orientation with a cooperative *win-win* orientation that leads to a mutually beneficial resolution. A classic example: Two friends, after quarreling over an orange, agreed to split it. One squeezed his half for juice. The other used the peel from her half to flavor a cake. If only the two had communicated their motives to one another, they could have hit on the win-win solution of one having all the juice, the other all the peel.

Conciliation

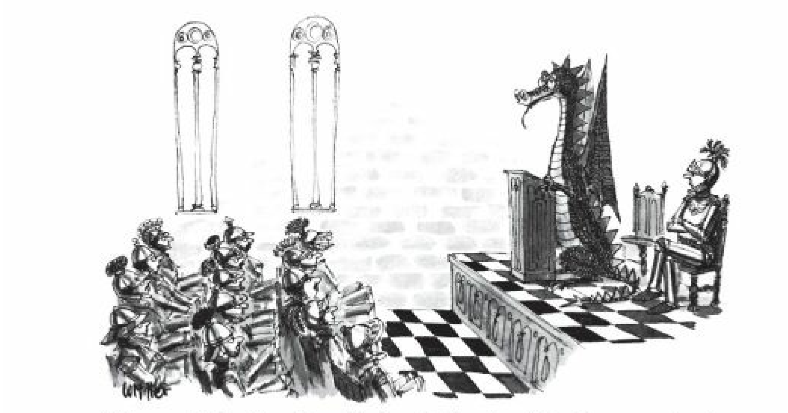
Understanding and cooperative resolution are most needed, yet least likely, in times of anger or crisis (Bodenhausen et al., 1994; Tetlock, 1988). When conflicts intensify, images become more stereotyped, judgments more rigid, and communication more difficult, or even impossible. Each party is likely to threaten, coerce, or retaliate. In the weeks before the 1990 Gulf War, the first President George Bush threatened, in the full glare of publicity, to "kick Saddam's ass." Saddam Hussein communicated in kind, threatening to make Americans "swim in their own blood."

Under such conditions, is there an alternative to war or surrender? Social psychologist Charles Osgood (1962, 1980) advocated a strategy of *Graduated and Reciprocated Initiatives in Tension-Reduction*, nicknamed **GRIT**. In applying GRIT, one side first announces its recognition of mutual interests and its intent to reduce tensions. It then initiates one or more small, conciliatory acts. Without weakening one's retaliatory capability, this modest beginning opens the door for reciprocity by the other party. Should the enemy respond with hostility, one reciprocates in kind. But so, too, with any conciliatory response.

GRIT

Graduated and Reciprocated Initiatives in Tension-Reduction—a strategy designed to decrease international tensions.

In laboratory experiments, small conciliatory gestures—a smile, a touch, a word of apology—have allowed both parties to begin edging down the tension ladder to a safer rung where communication and mutual understanding can begin (Lindskold, 1978; Lindskold & Han, 1988). In a real-world international conflict, U.S. President John F. Kennedy's gesture of stopping atmospheric nuclear tests began a series of reciprocated conciliatory acts that culminated in the 1963 atmospheric test-ban treaty.



Warren Miller The New Yorker Collection/The Cartoon Bank

"To begin with, I would like to express my sincere thanks and deep appreciation for the opportunity to meet with you. While there are still profound differences between us, I think the very fact of my presence here today is a major breakthrough."

As working toward shared goals reminds us, we are more alike than different. Civilization advances not by conflict and cultural isolation, but by tapping the knowledge, the skills, and the arts that are each culture's legacy to the whole human race. Thanks to cultural sharing, our modern society has been enriched by our cultural mix (Sowell, 1991). We have China to thank for paper and printing and for the magnetic compass that opened the great explorations. We have Egypt to thank for trigonometry. We have the Islamic world and India's Hindus to thank for our Arabic numerals. While celebrating and claiming these diverse cultural legacies, we can also welcome the continuing enrichment of today's cultural diversity. We can view ourselves as instruments in a human orchestra. And we can therefore each affirm our own culture's heritage while building bridges of communication, understanding, and cooperation across our cultural traditions.

✓ Check Your Understanding

Ask Yourself

- Do you regret not getting along with some friend or family member? How might you resolve the conflict using concepts you have just learned?

Test Yourself

- Why do sports fans tend to feel a sense of satisfaction when their archrival team loses? Why do such feelings, in other settings, make conflict resolution more challenging?
- What are some ways to reconcile conflicts and promote peace?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

* * *

If you just finished reading this book, your AP® course introduction to psychological science is nearly complete. Our tour of psychological science has taught us much—and you, too?—about our moods and memories, about the reach of our unconscious, about how we flourish and struggle, about how we perceive our physical and social worlds, and about how our biology and culture shape us. Our hope, as your guides on this tour, is that you have shared some of our fascination, grown in your understanding and compassion, and sharpened your critical thinking. And we hope you enjoyed the ride.

With every good wish in your future endeavors (including the AP® exam!),

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Module 80 REVIEW

80-1 ***What is altruism?*** **When are people most—and least—likely to help?**

- *Altruism* is unselfish regard for the well-being of others.
- We are most likely to help when we (a) notice an incident, (b) interpret it as an emergency, and (c) assume responsibility for helping. Other factors, including our mood and our similarity to the victim, also affect our willingness to help.
- We are least likely to help if other bystanders are present (the *bystander effect*).

80-2 How do social exchange theory and social norms explain helping behavior?

- *Social exchange theory* is the view that we help others because it is in our own self-interest; in this view, the goal of social behavior is maximizing personal benefits and minimizing costs.
- Others believe that helping results from socialization, in which we are taught guidelines for expected behaviors in social situations, such as the *reciprocity norm* and the *social-responsibility norm.*

80-3 How do social traps and mirror-image perceptions fuel social conflict?

- A *conflict* is a perceived incompatibility of actions, goals, or ideas.
- *Social traps* are situations in which people in conflict pursue their own individual self-interest, harming the collective well-being.
- Individuals and cultures in conflict also tend to form *mirror-image perceptions:* Each party views the opponent as untrustworthy and evil-intentioned, and itself as an ethical, peaceful victim. Perceptions can

become *self-fulfilling prophecies.*

80-4 What can we do to promote peace?

- Peace can result when individuals or groups work together to achieve *superordinate* (shared) *goals.*
- Research indicates that four processes—contact, cooperation, communication, and conciliation—help promote peace.

Multiple-Choice Questions

1. Putting himself in danger, Nish stood up to the bullies who were beating up Neel in a display of

a. assuming responsibility.
b. mirror-image perceptions.
c. altruism.
d. the bystander effect.
e. diffusion of responsibility.

2. Sherif and his colleagues found that by providing hostile groups with ______, they were able to reduce tension as they worked together to solve problems.

a. superordinate goals
b. self-fulfilling prophecies
c. mirror-image perceptions
d. social traps
e. GRIT

3. A situation in which the conflicting parties, by rationally pursuing their self-interest, become caught in mutually destructive behavior is known as a

a. social trap.
b. conflict.
c. bystander effect.

d. diffusion of responsibility.
e. social-responsibility norm.

4. Lee feels that he cannot understand chemistry, so he gives up on doing the homework or studying for tests. When he fails chemistry he is demonstrating a(n)

a. superordinate goal.
b. mirror-image perception.
c. enemy perception.
d. social trap.
e. self-fulfilling prophecy.

Practice FRQs

1. According to Darley and Latané, what three things must happen for a bystander to intervene?

Answer

1 point: The bystander must notice the event. Page 817

1 point: The bystander must interpret the incident as an emergency. Page 817

1 point: The bystander must assume responsibility. Page 817

2. Several years from now, your best friend asks you to help move all of his furniture out of his parents' house into his new apartment. Explain how each of the following will play a role in deciding whether to help your friend move.

- Social exchange theory
- Reciprocity norm

(2 points)

UNIT XIV REVIEW

KEY TERMS AND CONCEPTS TO REMEMBER

social psychology, p. 768

attribution theory, p. 768

fundamental attribution error, p. 768

attitude, p. 770

peripheral route persuasion, p. 771

central route persuasion, p. 771

foot-in-the-door phenomenon, p. 771

role, p. 772

cognitive dissonance theory, p. 773

norms, p. 775

conformity, p. 776

normative social influence, p. 777

informational social influence, p. 778

social facilitation, p. 784

social loafing, p. 785

deindividuation, p. 786

group polarization, p. 787

groupthink, p. 788

culture, p. 789

prejudice, p. 792

stereotype, p. 792

discrimination, p. 792

just-world phenomenon, p. 796

ingroup, p. 796

outgroup, p. 796

ingroup bias, p. 796

scapegoat theory, p. 797
other-race effect, p. 797
aggression, p. 801
frustration-aggression principle, p. 803
social script, p. 804
mere exposure effect, p. 808
passionate love, p. 812
companionate love, p. 813
equity, p. 813
self-disclosure, p. 814
altruism, p. 816
bystander effect, p. 817
social exchange theory, p. 818
reciprocity norm, p. 818
social-responsibility norm, p. 819
conflict, p. 819
social trap, p. 819
mirror-image perceptions, p. 820
self-fulfilling prophecy, p. 820
superordinate goals, p. 821
GRIT, p. 822

KEY CONTRIBUTORS TO REMEMBER

Philip Zimbardo, p. 772
Leon Festinger, p. 773
Solomon Asch, p. 776
Stanley Milgram, p. 778
John Darley, p. 816
Bibb Latané, p. 816

AP® EXAM PRACTICE QUESTIONS

Multiple-Choice Questions

1. The enhancement of a group's prevailing tendencies occurs when people within a group discuss an idea that most of them either favor or oppose. What is this tendency called?

a. Group polarization
b. Deindividuation
c. The just-world phenomenon
d. Discrimination
e. Categorization

2. Caroline hates to do group projects with Jake because she ends up doing much more of the work than he does. Jake is engaging in

a. social facilitation.
b. a social trap.
c. social loafing.
d. self-disclosure.
e. altruism.

3. Samir does not feel any obligation to help the homeless people he sees each morning on the way to the subway. He assumes it is their fault that they are homeless and that they must have done something to deserve it. Samir's assumptions represent

a. a stereotype.
b. an ingroup bias.
c. altruism.
d. aggression.
e. the just-world phenomenon.

4. According to research on the bystander effect, which of the following people is most likely to stop and help a stranger?

a. Jacob is on his way to a doctor's appointment with his young son.
b. Xavier lives in a crowded city.

c. Malika is in a terrible mood, having just learned that she failed her midterm exam.
d. Ciera just saw a young girl offering her arm to help an older woman cross the street.
e. Mahmood is lost in thought as he walks to work, worrying about his upcoming presentation.

5. Students at Interlake High School believe they are superior to West Lake High School in every way possible. This is a demonstration of

a. ingroup bias.
b. conformity.
c. scapegoat theory.
d. discrimination.
e. groupthink.

6. People frequently blame internal dispositions for others' behavior according to

a. the foot-in-the-door phenomenon.
b. the fundamental attribution error.
c. attribution.
d. social psychology.
e. social thinking.

7. Geoff and Todd tried to buy tickets to see their favorite band, but they were unable to do so because the show sold out by the time they filled in the online form. Geoff swipes his laptop onto the floor in anger. The best explanation for why he does this is

a. the proximity effect.
b. GRIT.
c. the frustration-aggression principle.
d. social scripting.
e. deindividuation.

8. Galileo's notion that the earth revolved around the sun was in opposition to the widespread beliefs of his era. Over time, his ideas were accepted by more and more scholars. What social psychological principle is this an example of?

a. Social thinking
b. Group polarization
c. Conformity
d. A stereotype
e. Minority influence

9. Jackson downloaded an album, even though he liked only one of the songs. Over time he has found that he likes the other songs on the album as well. This is best explained by

a. the mere exposure effect.
b. hindsight bias.
c. aggression.
d. the just-world phenomenon.
e. the other-race effect.

0. The tension that occurs when we become aware that our attitudes and actions don’t coincide is known as

a. role playing.
b. the fundamental attribution error.
c. social pressure.
d. social influence.
e. cognitive dissonance.

1. A teacher offers her class the option of 3 or 10 points of extra credit. She explains that if most of the class ask for only 3 points, then they will all get the extra credit, but if most of the class asks for 10 points, then no one will earn any extra credit. Most of the students, hoping to gain more themselves and not thinking of the collective well-being of the class, ask for 10 points, and the whole class gets nothing. The class is demonstrating

a. GRIT.
b. the fundamental attribution error.

c. a social trap.
d. scapegoat theory.
e. discrimination.

2. Which of the following *least* describes prejudice?

a. An unjustifiable attitude toward a group
b. Schemas that influence how we notice and interpret events
c. Preconceived ideas that bias our impressions of others' behavior
d. A physical behavior intended to harm someone physically or emotionally
e. Automatic and unconscious thoughts and behaviors

3. Among the main factors that determine whether a relationship will form and last are

I. I. proximity.
II. II. financial status.
III. III. similarity.

a. I only
b. II only
c. III only
d. I & II only
e. I & III only

4. Becoming less self-conscious and less restrained when in a group situation is referred to as

a. social loafing.
b. deindividuation.
c. social facilitation.
d. obedience.
e. cognitive dissonance.

5. Carol believes that Paul is mad at her so she chooses to ignore him, which serves to actually make him mad at her. This is an example of

a. superordinate goals.

b. tension-reduction.
c. a social trap.
d. a mirror-image perception.
e. a self-fulfilling prophecy.

6. Which of the following is the most complete definition of conformity?

a. Sharing a mood with others
b. Unconsciously mimicking the behaviors and reactions of others
c. Changing thoughts about a situation in order to please an authority figure
d. Adjusting our behavior or thinking toward some group standard
e. Bringing our attitudes in line with our actions

7. People are more likely to disobey an authority figure when

a. they are alone with the authority figure.
b. the authority figure is male.
c. the authority figure’s request would cause harm to another person.
d. they are in a group with more than three people.
e. they have seen someone else disobey.

8. Tim pulls into traffic behind an older woman and immediately gets irritated because “old women can’t drive.” Tim’s belief is

a. a norm.
b. a stereotype.
c. the frustration-aggression principle.
d. a mirror-image perception.
e. discrimination.

9. After being married 50 years, Nancy and Bill feel a deep, affectionate attachment to each other after all that they have shared throughout their marriage. Psychologists would say that they have developed

a. passionate love.
b. a social script.
c. an ingroup bias.

d. companionate love.
e. GRIT.

0. Although most members of the faculty were strongly against the proposed new schedule, they did not voice their objections because two well-liked senior faculty members were in favor of the new schedule. This small group of dissenters were demonstrating

a. minority influence.
b. ingroup bias.
c. group polarization.
d. groupthink.
e. a norm.

Free-Response Questions

1. Abi moved from her small rural hometown to a large city to pursue her singing career. She was soon hired for an important and popular choral performance and was nervous but excited about this new opportunity. Explain how the following social psychology factors might affect her experiences in the “big city.”

- Self-fulfilling prophecy
- Frustration-aggression model
- Social facilitation
- Reciprocity norm

Rubric for Free Response Question 1

1 point: Self-fulfilling prophecy: Abi may think that she is not talented enough to compete with all of the other singers in the performance. Because of her low expectations of herself, she may not perform to the best of her ability. Page 820

1 point: Frustration-aggression model: If Abi does not progress to her satisfaction, and experiences frustration as her career stagnates, she may lash out at her colleagues either physically or verbally, or even try to sabotage others’ careers to further her own. Page 803

1 point: Social facilitation: Abi has been singing for a number of years. Because this is a well-practiced activity, Abi’s performance should be enhanced by the presence of others. Because she will have larger crowds in the “big city,” Abi’s performance should improve in front of larger crowds. Page 784

1 point: Reciprocity norm: If Abi receives gifts (such as flowers) from the audience, she may be motivated to give an extra effort in her performances. If the audience perceives that Abi is throwing herself completely into her performances, they may be more likely to applaud and cheer because the reciprocity norm indicates we will often return the efforts or feelings of others. Page 818

2. Ken has just taken a job with an organization that raises money to provide assistance to homeless veterans. Explain how Ken could use each of the following to increase donations.

- Foot-in-the-door phenomenon
- Central route persuasion
- Social responsibility norm
- Normative social influence
- Conformity

(5 points)

3. Dutch is in his first year as a student at a large university. At the urging of some friends, he attended a pep rally the night before the football game. At the rally, the marching band played the university’s fight song and Dutch began singing along as they did. The head football coach then gave a rousing speech, and Dutch joined with the hundreds of other students to cheer him. Although Dutch had not paid attention to the football team prior to the rally, he enthusiastically participated in the rally, even going so far as to have an image of the team’s mascot painted on his face. The following day, he attended the game and since has become an avid fan of the football team.

Analyze Dutch’s behavior at the rally and afterward, using each of the following principles of social psychology:

- Peripheral route persuasion
- Ingroup bias
- Social facilitation
- Deindividuation

(4 points)

Enrichment Modules

Mark Macewen/Nature Picture Library/Getty Images

MODULES

81 Influences on Drug Use

82 Psychology at Work

83 Animal Thinking and Language

Module **81 Influences on Drug Use**

LEARNING TARGETS

- 81-1 Explain why some people become regular users of consciousness-altering drugs.

81-1 Why do some people become regular users of consciousness-altering drugs?

Drug use by North American youth increased during the 1970s. Then, with increased drug education and a more realistic and deglamorized media depiction of taking drugs, drug use declined sharply (except for a small rise in the mid-1980s). After the early 1990s, the cultural antidrug voice softened, and some drugs for a time were again glamorized in music and films. Consider, for example, historical trends in the use of marijuana:

- In the University of Michigan's annual survey of 15,000 U.S. high school seniors, the proportion who said there is "great risk" in regular marijuana use rose from 35 percent in 1978 to 79 percent in 1991, then retreated to 31 percent in 2016 (Johnston et al., 2017).
- After peaking in 1978, marijuana use by U.S. high school seniors declined through 1992, then rose, but has recently been holding steady (see **Figure 81.1**). Among Canadian 15- to 24-year-olds, 23 percent report using marijuana monthly, weekly, or daily (Health Canada, 2012).

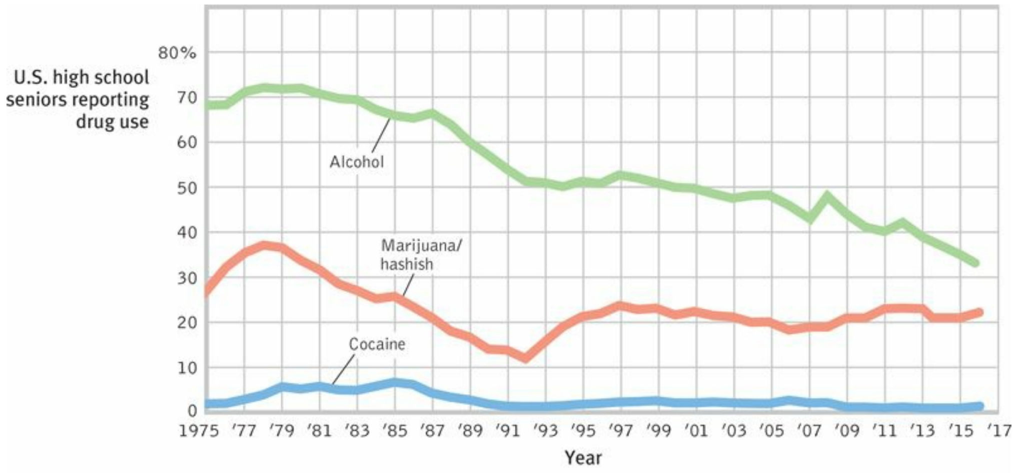

Figure 81.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Johnston et al., 2017; Miech et al., 2016.

Figure 81.1 Trends in drug use

The percentage of U.S. high school seniors who said they had used alcohol, marijuana, or cocaine during the past 30 days largely declined from the late 1970s to 1992, when it partially rebounded for a few years.

For some adolescents, occasional drug use represents thrill seeking. Yet why do some adolescents, but not others, become regular drug users? In search of answers, researchers have engaged biological, psychological, and social-cultural levels of analysis.

FYI

Warning signs of alcohol use disorder:

- Drinking binges
- Craving alcohol
- Use results in unfulfilled work, school, or home tasks
- Failing to honor a resolve to drink less
- Continued use even when aware of risks involved
- Avoiding family or friends when drinking

Biological Influences

Some people may be biologically vulnerable to particular drugs. For example, evidence accumulates that heredity influences some aspects of substance use problems, especially those appearing by early adulthood (Crabbe, 2002):

- *Twin studies.* If an identical rather than fraternal twin is diagnosed with alcohol use disorder, the other twin is at increased risk for alcohol problems (Kendler et al., 2002). In marijuana use, too, identical twins more closely resemble each other than do fraternal twins.
- *Genetics research.* Researchers have identified genes associated with alcohol use disorder, and they are seeking genes that contribute to tobacco addiction (Stacey et al., 2012). These culprit genes seemingly produce deficiencies in the brain's natural dopamine reward system: While triggering temporary dopamine-produced pleasure, the addictive drugs disrupt normal dopamine balance. Studies of how drugs reprogram the brain's reward systems raise hopes for anti-addiction drugs that might block or blunt the effects of alcohol and other drugs (Miller, 2008; Wilson & Kuhn, 2005).
- *Adoption studies.* One study tracked 18,115 Swedish adoptees. Those with drug-abusing biological parents were at doubled risk of drug abuse, indicating a genetic influence. But then those with drug-abusing adoptive siblings also had a doubled risk of drug abuse, indicating an environmental influence (Kendler et al., 2012).

So, what might those environmental influences be?

Psychological and Social-Cultural Influences

Throughout this text, you have seen that biological, psychological, and social-cultural factors interact to produce behavior. So, too, with problematic drug use (**Figure 81.2**). One psychological factor that has appeared in studies of youth and young adults is the feeling that life is meaningless and directionless (Newcomb & Harlow, 1986). This feeling is common among school dropouts who subsist without job skills, without privilege, and with little hope.

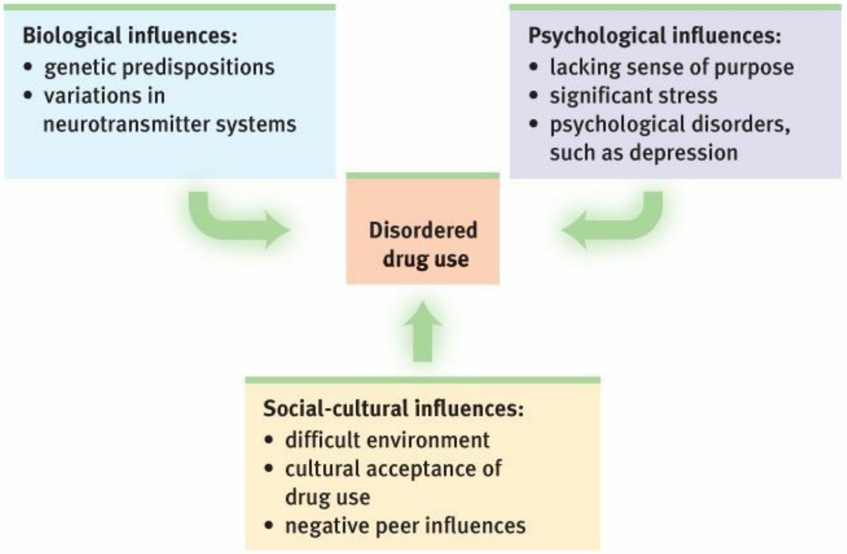
Biological influences:
• genetic predispositions
• variations in neurotransmitter systems
Psychological influences:
• lacking sense of purpose
• significant stress
• psychological disorders, such as depression
Disordered drug use
Social-cultural influences:
• difficult environment
• cultural acceptance of drug use
• negative peer influences

Figure 81.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 81.2 Biopsychosocial approach

Researchers investigate disordered drug use from complementary perspectives.

Sometimes the psychological influence is obvious. Many heavy users of alcohol, marijuana, and cocaine have experienced significant stress or failure and are depressed. Girls with a history of depression, eating disorders, or sexual or physical abuse are at increased risk for problematic substance use. So are youth undergoing school or neighborhood transitions (CASA, 2003; Logan et al., 2002). By temporarily dulling their psychological pain, psychoactive drugs may offer a way to avoid coping with depression, anger, anxiety, or insomnia. (As Unit VI explained, behavior is often controlled more by its immediate consequences than by its later ones.)

Smoking usually begins during early adolescence. (If the cigarette manufacturers haven't made you their devoted customer by the time you reach college or university, they almost surely never will.) Adolescents, self-conscious and often thinking the world is watching their every move, are especially vulnerable to smoking's allure. They may first light up to imitate glamorous celebrities, to project a mature image, to handle stress, or to get the social reward of acceptance by other smokers (Cin et al., 2007; DeWall & Pond, 2011; Tickle et al., 2006). Mindful of these tendencies, cigarette companies have effectively modeled smoking with themes that appeal to youths: attractiveness, independence, adventurousness, peer approval (Surgeon General, 2012). Typically, teens who start smoking also have friends who smoke, who offer them cigarettes and describe the pleasure cigarettes bring (Rose et al., 1999). Among teens whose parents and best friends are nonsmokers, the smoking rate is close to zero (Moss et al., 1992; also see **Figure 81.3**).

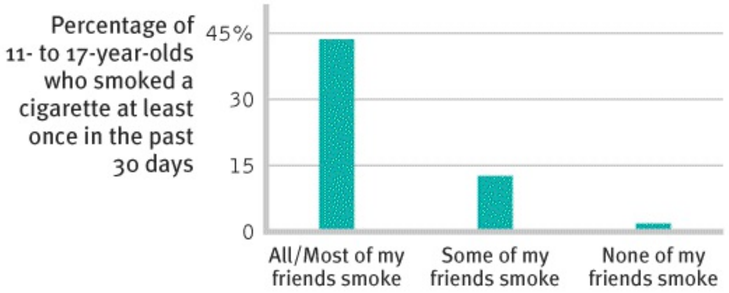

Figure 81.3
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Figure 81.3 Peer influence

Kids seldom smoke if their friends don't (Philip Morris, 2003). A correlation-causation question: Does the close link between teen smoking and friends' smoking reflect peer influence? Teens seeking similar friends? Or both?

Rates of drug use also vary across cultural and ethnic groups. One survey of European teens found that lifetime marijuana use ranged from 5 percent in Norway to more than eight times higher in the Czech Republic

(Romelsjö et al., 2014). Independent U.S. government studies of drug use in households and among high schoolers nationwide reveal that African-American teens have sharply lower rates of drinking, smoking, and cocaine use (Johnston et al., 2007). Alcohol and other drug addiction rates have also been low among actively religious people, with extremely low rates among Orthodox Jews, Mormons, Mennonites, and the Amish (DeWall et al., 2014; Salas-Wright et al., 2012).

Pictorial Press Ltd/Alamy

Nic-A-Teen Virtually nobody starts smoking past the vulnerable teen years. Eager to hook customers whose addiction will give them business for years to come, cigarette companies target teens. Portrayals of smoking by popular actors, such as Scarlett Johansson in *Hail, Caesar!*, tempt teens to imitate.

Whether in cities or rural areas, peers influence attitudes about substance use. They also throw the parties and provide (or don't provide) the drugs. If an adolescent's friends use drugs, the odds are that he or she will, too. If the friends do not, the opportunity may not even arise. Teens who come from happy families, who do not begin drinking before age 15, and who do well in school tend not to use drugs, largely because they rarely associate with those who do (Bachman et al., 2007; Hingson et al., 2006; Odgers et al., 2008).

Peer influence is more than what friends do or say. Adolescents' expectations—what they *believe* friends are doing and favoring—influence their behavior (Vitória et al., 2009). One study surveyed sixth graders in

22 U.S. states. How many believed their friends had smoked marijuana? About 14 percent. How many of those friends acknowledged doing so? Only 4 percent (Wren, 1999). University students are not immune to such misperceptions: Drinking dominates social occasions partly because students overestimate their peers' enthusiasm for alcohol and underestimate their views of its risks (Miller & Prentice, 2016; Self, 1994) (**Table 81.1**). When students' overestimates of peer drinking are corrected, alcohol use often subsides (Moreira et al., 2009).

TABLE 81.1 Facts About "Higher" Education

• College and university students drink more alcohol than their nonstudent peers and exhibit 2.5 times the general population's rate of substance abuse.
• Fraternity and sorority members report nearly twice the binge-drinking rate of nonmembers.
• Since 1993, campus smoking rates have declined, alcohol use has been steady, and abuse of prescription opioids, stimulants, tranquilizers, and sedatives has increased, as has marijuana use.

Source: NCASA, 2007.

People whose beginning use of drugs was influenced by their peers are more likely to stop using when friends stop or their social network changes (Chassin & MacKinnon, 2015). One study that followed 12,000 adults over 32 years found that smokers tend to quit in clusters (Christakis & Fowler, 2008). Within a social network, the odds of a person quitting increased when a spouse, friend, or co-worker stopped smoking. Similarly, most soldiers who engaged in problematic drug use while in Vietnam ceased their drug use after returning home (Robins et al., 1974).

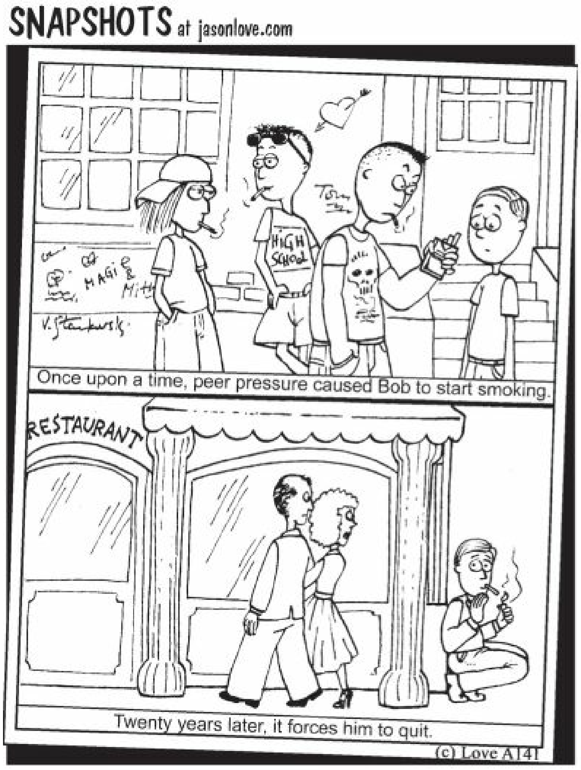
FYI

Percentage of adults drinking weekly or more has varied by country:

United States	30%
Canada	40%
Britain	58%

(Gallup Poll, from Moore, 2006)

As always with correlations, the traffic between friends' drug use and our own may be two-way: Our friends influence us. Social networks matter. But we also select as friends those who share our likes and dislikes.


SNAPSHOTS at jasonlove.com
HIGH SCHOOL
Once upon a time, peer pressure caused Bob to start smoking.
RESTAURANT
Twenty years later, it forces him to quit.
(c) Love A141

© Jason Love

What do the findings on drug use suggest for drug prevention and treatment programs? Three channels of influence seem possible:

- Educate young people about the long-term costs of a drug's temporary pleasures.
- Help young people find other ways to boost their self-esteem and discover their purpose in life.
- Attempt to modify peer associations or to "inoculate" youth against peer pressures by training them in refusal skills.

> *" Substance use disorders don't discriminate; they affect the rich and the poor; they affect all ethnic groups. This is a public health crisis, but we do have*

solutions.”

U.S. Surgeon General Vivek Murthy, 2016

People rarely abuse drugs if they understand the physical and psychological costs, feel good about themselves and the direction their lives are taking, and are in a peer group that disapproves of using drugs. These educational, psychological, and social-cultural factors may help explain why 26 percent of U.S. high school dropouts, but only 6 percent of those with a postgraduate education, report smoking (CDC, 2011).

✓ Check Your Understanding

Ask Yourself

- Drinking dominates parties when students overestimate other students’ enthusiasm for alcohol. What sorts of misperceptions exist at your high school?

Test Yourself

- Why do tobacco companies try so hard to get customers hooked as teens?
- Studies have found that people who begin drinking in their early teens are much more likely to develop alcohol use disorder than those who begin at age 21 or after. What possible explanations might there be for this correlation?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 81 REVIEW

81-1 Why do some people become regular users of consciousness-altering drugs?

- Some people may be biologically vulnerable to particular drugs, such as alcohol.
- Psychological factors (such as stress or depression) and social factors (such as peer pressure) combine to lead many people to experiment with drugs. Cultural and ethnic groups have differing rates of drug use.
- Each type of influence—biological, psychological, and social-cultural—offers a possible path for drug prevention and treatment programs.

Multiple-Choice Questions

1. Which of the following is most clearly a biological influence on disordered drug use?

a. Significant stress.
b. Variations in neurotransmitter systems.
c. An urban environment.
d. Peer influence.
e. A lack of purpose.

2. In studies that examine perceived rates of alcohol use, students

a. typically overestimate the percentage of fellow students who drink.
b. accurately estimate the percentage of fellow students who drink.
c. tend to slightly underestimate the percentage of fellow students who drink.
d. tend to greatly underestimate the percentage of fellow students who drink.
e. tend to be inaccurate in their estimates of the percentage of fellow students who drink, but there is no clear pattern to their inaccuracies.

Practice FRQ

1. Briefly explain one biological, one psychological, and one social-cultural influence on drug use.

(3 points)

Module **82 Psychology at Work**

LEARNING TARGETS

- 82-1 Explain the concept of *flow.*
- 82-2 Describe three key areas of study related to industrial-organizational psychology.
- 82-3 Discuss how personnel psychologists facilitate job seeking, employee selection, work placement, and performance appraisal.
- 82-4 Describe the role of organizational psychologists.
- 82-5 Examine some effective leadership techniques.
- 82-6 Discuss what cultural influences need to be considered when choosing an effective leadership style.
- 82-7 Describe human factors psychologists' work to create user-friendly machines and work settings.

For most people, to live is to work. Work is life's biggest waking activity. Work helps satisfy multiple needs. Work supports us, enabling food, water, and shelter. Work connects us, meeting our social needs. Work helps define us. Meeting someone for the first time and wondering about their identity, we may ask, "So, what do you do?"?"

But the answer may give us only a partial picture of a person's life. We have many motives beyond work, including the desire for family, friends, and hobbies. We also vary in our job satisfaction. On the day we leave the workforce, some of us will sadly bid our former employer farewell; others will bid our former employer good riddance. What factors influence our perceptions of work as an activity marked by frustration versus *flow,* as a necessary chore versus a meaningful calling, or as an opportunity to do the bare minimum versus maximize our potential?

Flow

82-1 What is *flow*?

Individuals across various occupations vary in their attitudes toward their work. Some view their work as a *job,* an unfulfilling but necessary way to make money. Others view their work as a *career,* an opportunity to advance from one position to a better position. The rest—those who view their work as a *calling,* a fulfilling and socially useful activity—report the highest satisfaction with their work and with their lives (Dik & Duffy, 2012; Wrzesniewski & Dutton, 2001; Wrzesniewski et al., 1997).

This finding would not surprise Mihaly Csikszentmihalyi [chick-SENT-me-hi] (1990, 1999). He observed that our quality of life increases when we are purposefully engaged. Between the anxiety of being overwhelmed and stressed, and the apathy of being underwhelmed and bored, lies a zone in which we experience **flow**. When was the last time you experienced flow? Perhaps you can recall being in a zoned-out flow state while texting or playing a video game. If so, then perhaps you can sympathize with the two Northwest Airlines pilots who in 2009 were so focused on their laptops that they missed their control tower’s messages. The pilots flew 150 miles past their Minneapolis destination—and lost their jobs.

flow

a completely involved, focused state, with diminished awareness of self and time; results from full engagement of our skills.

Csikszentmihalyi formulated the flow concept after studying artists who spent hour after hour painting or sculpting with focused concentration. Immersed in a project, they worked as if nothing else mattered, and then, when finished, they promptly forgot about it. The artists seemed driven less by external rewards—money, praise, promotion

—than by the intrinsic rewards of creating their art. Nearly 200 other studies confirm that *intrinsic motivation* enhances performance (Cerasoli et al., 2014).

Csikszentmihalyi studied dancers, chess players, surgeons, writers, parents, mountain climbers, sailors, and farmers. His research included Australians, North Americans, Koreans, Japanese, and Italians. Participants ranged in age from the teen years to the golden years. A clear principle emerged: It’s exhilarating to flow with an activity that fully engages our skills (Fong et al., 2015). Flow experiences boost our sense of self-esteem, competence, and well-being. Idleness may sound like bliss, but purposeful work enriches our lives. Busy people are happier (Hsee et al., 2010; Robinson & Martin, 2008). One research team interrupted people on about a quarter-million occasions (using a phone app), and found people’s minds wandering 47 percent of the time. They were, on average, happier when their mind was *not* wandering (Killingsworth & Gilbert, 2010).

FYI

Sometimes, notes Gene Weingarten (2002), a humorist knows “when to just get out of the way.” Here are some sample job titles from the U.S. *Department of Labor Dictionary of Occupational Titles*: Animal impersonator, human projectile, banana ripening-room supervisor, impregnator, impregnator helper, dope sprayer, finger waver, rug scratcher, egg smeller, bottom buffer, cookie breaker, brain picker, hand pouncer, bosom presser, and mother repairer.

Finding Your Own Flow, and Matching Interests to Work

Want to identify your own path to flow? You can start by pinpointing your strengths and the types of work that may prove satisfying and successful. Marcus Buckingham and Donald Clifton (2001) suggested asking yourself four questions.

1. What activities give me pleasure? Bringing order out of chaos? Playing host? Helping others? Challenging sloppy thinking?

2. What activities leave me wondering, “When can I do this again?” rather than, “When will this be over?”
3. What sorts of challenges do I relish? And which do I dread?
4. What sorts of tasks do I learn easily? And which do I struggle with?

FYI

Have you ever noticed that when you are immersed in an activity, time flies? And that when you are watching the clock, it seems to move more slowly? French researchers have confirmed that the more we attend to an event’s duration, the longer it seems to last (Couli et al., 2004).

You may find your skills engaged and time flying when teaching or selling or writing or cleaning or consoling or creating or repairing. If an activity feels good, if it comes easily, if you look forward to it, then look deeper. You’ll see your strengths at work (Buckingham, 2007). For a free (requires registration) assessment of your own strengths, take the “Brief Strengths Test” at AuthenticHappiness.sas.upenn.edu.

Erik Isakson/Tetra Images/Corbis

Life disrupted Playing and socializing online are ever-present sources of distraction. It takes energy to resist checking our phones, and time to refocus mental concentration after each disruption. Such frequent interruptions disrupt flow, so it’s a good idea to instead schedule regular breaks for checking our handheld devices.

The U.S. Department of Labor also offers a career interest questionnaire through its Occupational Information Network (O*NET). At MyNextMove.org/explore/ip you will need about 10 minutes to respond to 60 items, indicating how much you would like or dislike activities ranging from building kitchen cabinets to playing a musical instrument. You will then receive feedback on how strongly your responses reflect six interest types (Holland, 1996):

- *Realistic* (hands-on doers)
- *Investigative* (thinkers)
- *Artistic* (creators)
- *Social* (helpers, teachers)
- *Enterprising* (persuaders, deciders)
- *Conventional* (organizers)

Finally, depending on how much training you are willing to complete, you will be shown occupations that fit your interest pattern (selected from a national database of 900+ occupations).

> “*Find a job you love, and you’ll never work another day of your life.*”
>
> *Facebook hiring video, 2016*

Do what you love and you will love what you do. A career counseling science aims, first, to assess people’s differing values, personalities, and, especially, interests, which are remarkably stable (Dik & Rottinghaus, 2013). (Your job may change, but your interests today will likely still be your interests in 10 years.) Second, it aims to alert people to well-matched vocations—vocations with a good *person-environment fit*. One study assessed 400,000 high school students’ interests and then followed them over time. The take-home finding: “Interests uniquely predict academic and career success over and above cognitive ability and personality” (Rounds & Su, 2014). Sixty other studies confirm the point both for students in school and workers on the job: Interests predict both performance and persistence (Nye et al., 2012). Lack of job fit can fuel frustration, resulting in unproductive and even hostile work behavior (Harold et al., 2016). One fee-based online service, jobzology.com, was developed by I/O psychologists to implement career counseling science. First, it assesses people’s interests, values, personalities, and workplace culture preferences. It then suggests occupations and connects them to job listings.

Industrial-Organizational Psychology

82-2 What are three key areas of study related to industrial-organizational psychology?

In developed nations work has expanded, from farming to manufacturing to *knowledge work*. More and more work is *outsourced* to temporary employees and consultants, or to workers telecommuting from off-site workplaces (Allen et al., 2015). (This book and its teaching package are developed and produced by a team of people in a dozen cities, from Alberta to Florida.) As work has changed, have our attitudes toward our work also changed? Has our satisfaction with work increased or decreased? Has the *psychological contract*—the sense of mutual obligations between workers and employers—become more or less trusting and secure? These are among the questions that fascinate **industrial-organizational (I/O) psychologists** as they apply psychology's principles to the workplace (**Table 82.1**).

industrial-organizational (I/O) psychology

the application of psychological concepts and methods to optimizing human behavior in workplaces.

TABLE 82.1 I/O Psychology and Human Factors Psychology at Work As scientists, consultants, and management professionals, industrial-organizational (I/O) psychologists may be found helping organizations to resolve work-family conflicts, build employee retention, address organizational climate, or promote team work. Human factors psychologists contribute to safety and improved designs.

Personnel Psychology: Maximizing Human Potential	Organizational Psychology: Building Better Organizations
Developing training programs to	**Developing organizations**

increase job seekers’ success **Selecting and placing employees** • Developing and testing assessment tools for selecting, placing, and promoting workers • Analyzing job content • Optimizing worker placement **Training and developing employees** • Identifying needs • Designing training programs • Evaluating training programs **Appraising performance** • Developing guidelines • Measuring individual performance • Measuring organizational performance	• Analyzing organizational structures • Maximizing worker satisfaction and productivity • Facilitating organizational change **Enhancing quality of work life** • Expanding individual productivity • Identifying elements of satisfaction • Redesigning jobs • Balancing work and nonwork life in an era of social media, smart phones, and other technologies
	Human Factors Psychology
	• Designing optimum work environments • Optimizing person-machine interactions • Developing systems technologies

Information from the Society of Industrial and Organizational Psychology. For more information about I/O psychology and related job opportunities, visit siop.org.

The I/O psychology subfield of **personnel psychology** applies psychology’s methods and principles to selecting, placing, training, and evaluating workers. Personnel psychologists match people with jobs, by identifying and placing well-suited candidates. The I/O psychology subfield of **organizational psychology** considers how work environments and management styles influence worker motivation, satisfaction, and productivity. It focuses on modifying jobs and supervision in ways that boost morale and productivity.

personnel psychology

an I/O psychology subfield that helps with job seeking, and with employee recruitment, selection, placement, training, appraisal, and development.

organizational psychology

an I/O psychology subfield that examines organizational influences on worker satisfaction and productivity and facilitates organizational change.

Human factors psychology, now a distinct field allied with I/O psychology, explores how machines and environments can be optimally designed to fit human abilities. Human factors psychologists study people’s natural perceptions and inclinations to create user-friendly machines and work settings.

human factors psychology

a field of psychology allied with I/O psychology that explores how people and machines interact and how machines and physical environments can be made safe and easy to use.

Left to right: Hope College; Lorie Hailey; Danielle Slevens; Kathryn Brownson; Trish Morgan; Don Probert; Laura Pachnos; Stephanie Ellis; Christine Brune; Heidi Bamatter; Laura Burden

The modern workforce The editorial team that supports the creation of this text and its resources works both in-house and from far-flung places. In column 1: Nancy Fleming in Massachusetts, Kathryn Brownson in Michigan, Katie Pachnos in New York, and Heidi Bamatter in New York. In column 2: Lorie Hailey in Kentucky, Trish Morgan in Alberta, Carlise Stembridge in Minnesota, and Laura Burden in New York. In column 3: Danielle Slevens in Massachusetts, Betty Probert in Florida, and Christine Brune in Washington, DC.

Personnel Psychology

82-3 How do personnel psychologists facilitate job seeking, employee selection, work placement, and performance appraisal?

Psychologists assist organizations at various stages of selecting and assessing employees. They may help identify needed job skills, develop effective selection methods, recruit and evaluate appropriate applicants, introduce and train new employees, and appraise their performance. They also help job seekers. Across four dozen studies, training programs (which teach job-search skills, improve self-presentation, boost self-confidence, promote goal setting, and enlist support) have nearly tripled job seekers' success (Liu et al., 2014).

Using Strengths for Successful Selection

As a new AT&T human resources executive, psychologist Mary Tenopyr (1997) was assigned to solve a problem: Customer-service representatives were failing at a high rate. After concluding that many of the hires were ill-matched to the demands of their new job, Tenopyr developed a new selection instrument:

1. She asked new applicants to respond to various test questions (without as yet making any use of their responses).
2. She followed up later to assess which of the applicants excelled on the job.
3. She identified the earlier test questions that best predicted success.

The happy result of her data-driven work was a new test that enabled AT&T to identify likely-to-succeed representatives. Personnel selection techniques such as this one aim to recruit people with the kind of strengths that will enable them and their organization to flourish. Marry the strengths of people with the tasks of organizations and the result is often prosperity and profit.

Do Interviews Predict Performance?

Employee selection usually includes an interview. And many interviewers feel confident of their ability to predict long-term job performance from a get-acquainted *(unstructured)* interview. What's therefore shocking is how error-prone interviewers' predictions may be when predicting job or graduate school success. From their review of 85 years of personnel-selection research, I/O psychologists Frank Schmidt and John Hunter (1998; Schmidt, 2002) determined that for all but less-skilled jobs, general mental ability best predicts on-the-job performance. Subjective overall evaluations from informal interviews are more useful than handwriting analysis (which is worthless). But informal interviews are less informative than aptitude tests, work samples, job knowledge tests, and past job performance. After studying thousands of informal interviews and later job success, Google found "zero relationship. It's a complete random mess" (Bock, 2013). *Structured interviews,* however, can produce more accurate predictions.

Unstructured Interviews and the Interviewer Illusion

Traditional, *unstructured interviews* can provide a sense of someone's personality—their expressiveness, warmth, and verbal ability, for example. But these informal interviews also give interviewees considerable power to control the impression they are making in the interview situation (Barrick et al., 2009). Why, then, do many interviewers have such faith in their ability to discern interviewees' fitness for a job? "I have excellent interviewing skills," I/O psychology consultants often hear, "so I don't need reference checking as much as someone who doesn't have my ability to read people." Overrating one's ability to predict people's futures is called the *interviewer illusion* (Dana et al., 2013; Nisbett, 1987). Five factors explain interviewers' overconfidence:

- **INTERVIEWERS PRESUME THAT PEOPLE ARE WHAT THEY SEEM TO BE IN THE INTERVIEW SITUATION.** An unstructured interview may create a false impression of a person's behavior toward others in different situations. Some interviewees may feign desired attitudes, others may be nervous. As personality psychologists explain—and as Module 74 explored—when meeting others, we discount the enormous influence of varying situations and mistakenly presume that what we see is what we will get. But research on everything from chattiness to conscientiousness reveals that how we behave reflects not only our enduring traits, but also the details of the particular situation (such as wanting to impress in a job interview).

- **INTERVIEWERS' PRECONCEPTIONS AND MOODS COLOR HOW THEY PERCEIVE INTERVIEWEES' RESPONSES** (Cable & Gilovich, 1998; Macan & Dipboye, 1994). If interviewers instantly like a person who perhaps is similar to themselves, they may interpret the person's assertiveness as indicating "confidence" rather than "arrogance." If told certain applicants have been prescreened, interviewers are disposed to judge them more favorably. Such interviewers are showing *confirmation bias*, which we learned about in Unit VII: They search for information that supports their preconceptions about a job candidate and ignore or distort contradictory evidence (Skov & Sherman, 1986).
- **INTERVIEWERS JUDGE PEOPLE RELATIVE TO THOSE INTERVIEWED JUST BEFORE AND AFTER THEM** (Simonsohn & Gino, 2013). If you are being interviewed for business or medical school, hope for a time when the other interviewees have been weak.
- **INTERVIEWERS MORE OFTEN FOLLOW THE SUCCESSFUL CAREERS OF THOSE THEY HAVE HIRED THAN THE SUCCESSFUL CAREERS OF THOSE THEY HAVE REJECTED.** This missing feedback prevents interviewers from getting a reality check on their hiring ability.
- **INTERVIEWS DISCLOSE THE INTERVIEWEE'S GOOD INTENTIONS, WHICH ARE LESS REVEALING THAN HABITUAL BEHAVIORS** (Ouellette & Wood, 1998). Intentions matter. People can change. But the best predictor of the person we will be is the person we have been. Compared with work-avoiding university students, those who engage in their tasks are more likely, a decade and more later, to be engaged workers (Salmela-Aro et al., 2009). In one forty-year study, responsible,

high-performing 12-year-old students tended to grow up to become successful, high-earning adult workers (Spengler et al., 2015). Wherever we go, we take ourselves along.

Hoping to improve prediction and selection, personnel psychologists have put people in simulated work situations, sought information on past performance, aggregated evaluations from multiple interviews, administered tests, and developed job-specific interviews.

Structured Interviews

Unlike casual conversation aimed at getting a feel for someone, **structured interviews** offer a disciplined method of collecting information. A personnel psychologist may analyze a job, script questions, and train interviewers. The interviewers then ask all applicants the same questions, in the same order, and rate each applicant on established scales.

structured interview

an interview process that asks the same job-relevant questions of all applicants, each of whom is rated on established scales.

In an unstructured interview, someone might ask, “How organized are you?” “How well do you get along with people?” or “How do you handle stress?” Street-smart applicants know how to score high: “Although I sometimes drive myself too hard, I handle stress by prioritizing and delegating, and leaving time for sleep and exercise.”

By contrast, structured interviews pinpoint strengths (attitudes, behaviors, knowledge, and skills) that distinguish high performers in a particular line of work. The process includes outlining job-specific situations and asking candidates to explain how they would handle them, and how they handled similar situations in their prior employment. “Tell me about a time when you were caught between conflicting demands, without time to accomplish both. How did you handle that?” In its interviews, Google has asked, “Give me an example of a time when you solved an analytically difficult problem” (Bock, 2013).

To reduce memory distortions and bias, the interviewer takes notes and makes ratings as the interview proceeds and avoids irrelevant and follow-up questions. The structured interview therefore feels less warm, but that can be explained to the applicant: “This conversation won’t typify how we relate to each other in this organization.”

A review of 150 findings revealed that structured interviews had double the predictive accuracy of unstructured interviews (Schmidt & Hunter, 1998; Wiesner & Cronshaw, 1988). Structured interviews also reduce bias, such as against overweight applicants (Kutcher & Bragger, 2004).

If, instead, we let our intuitions bias the hiring process, noted Malcolm Gladwell (2000, p. 86), then “all we will have done is replace the old-boy network, where you hired your nephew, with the new-boy network, where you hire whoever impressed you most when you shook his hand. Social progress, unless we’re careful, can merely be the means by which we replace the obviously arbitrary with the not so obviously arbitrary.”

To recap, personnel psychologists help train job seekers, and they assist organizations in analyzing jobs, recruiting well-suited applicants, and selecting and placing employees. They also appraise employees’ performance (**Figure 82.1**)—our next topic.

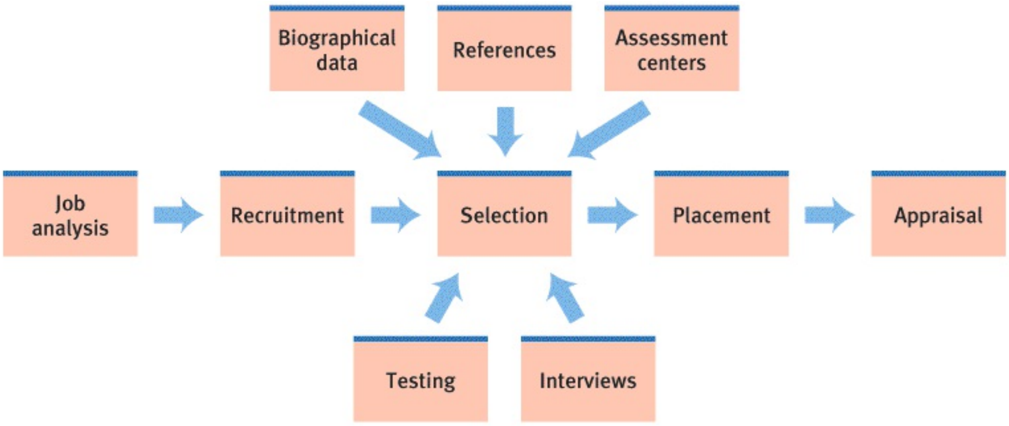


Figure 82.1
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 82.1 Personnel psychologists at work

Personnel psychologists consult in human resources activities, from job definition to recruitment to employee appraisal.

Appraising Performance

Performance appraisal serves organizational purposes: It helps decide who to keep on staff, how to appropriately reward and pay people, and how to better harness employee strengths, sometimes with job shifts or promotions. Performance appraisal also serves individual purposes: Feedback affirms workers' strengths and helps motivate needed improvements.

Performance appraisal methods include

- **CHECKLISTS** on which supervisors simply check specific behaviors that describe the worker ("always attends to customers' needs," "takes long breaks").
- **GRAPHIC RATING SCALES** on which a supervisor checks, perhaps on a five-point scale, how often a worker is dependable, productive, and so forth.
- **BEHAVIOR RATING SCALES** on which a supervisor checks scaled behaviors that describe a worker's performance. If rating the extent to which a worker "follows procedures," the supervisor might mark the employee somewhere between "often takes shortcuts" and "always follows established procedures" (Levy, 2003).

In some organizations, performance feedback comes not only from supervisors but also from all organizational levels. If you join an organization that practices *360-degree feedback* (**Figure 82.2**), you will rate yourself, your manager, and your other colleagues, and you will be rated by your manager, other colleagues, and customers (Green, 2002). The net result is often more open communication and more complete appraisal.

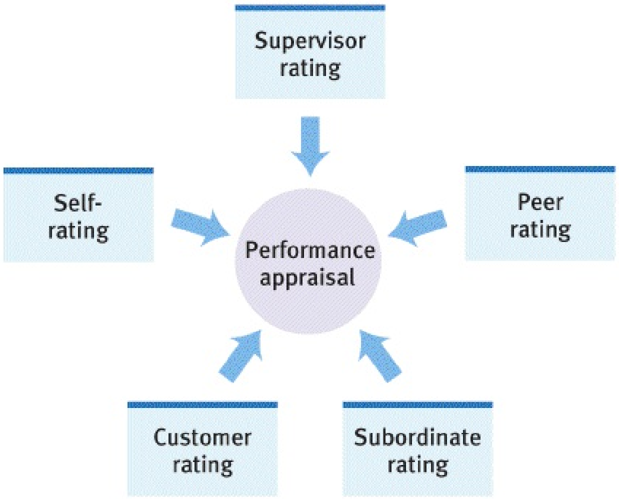


Figure 82.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure 82.2 360-degree feedback

With multisource 360-degree feedback, our knowledge, skills, and behaviors are rated by ourselves and surrounding others. University professors, for example, may be rated by their department chairs, their students, and their colleagues. After receiving all these ratings, professors discuss the 360-degree feedback with their department chair.

Performance appraisal, like other social judgments, is vulnerable to bias (Murphy & Cleveland, 1995). *Halo errors* occur when one's overall evaluation of an employee, or of a personal trait such as their friendliness, biases ratings of their specific work-related behaviors, such as their reliability. *Leniency* and *severity errors* reflect evaluators' tendencies to be either too easy or too harsh on everyone. *Recency errors* occur when raters focus only on easily remembered recent behavior. By using multiple raters and developing objective, job-relevant performance measures, personnel psychologists seek to support their organizations while also helping employees perceive the appraisal process as fair.

Check Your Understanding

Ask Yourself

- What have you learned about your own strengths and about the kind of career you might see yourself pursuing?

Test Yourself

- What is the value of finding flow in our work?
- A human resources director explains to you that “I don’t bother with tests or references. It’s all about the interview.” Based on I/O psychology research, what concerns does this raise?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Organizational Psychology

82-4 What is the role of organizational psychologists?

Successfully recruiting, hiring, training, and appraising workers matters, but so does employee motivation and morale. Organizational psychologists assist with efforts to motivate and engage employees.

Satisfaction and Engagement at Work

MLive/Advance/Barcroft Media

An engaged employee Mohamed Mamow, left, was joined by his employer in saying the Pledge of Allegiance as he became a U.S. citizen. Mamow and his wife met in a Somali refugee camp and have five children, whom he has supported by working as a machine operator. Mindful of his responsibility—“I don’t like to lose my job. I have a responsibility for my children and my family”—he would arrive for work a half hour early and tend to every detail on his shift. “He is an extremely hard-working employee,” noted his employer, and “a reminder to all of us that we are really blessed” (Roelofs, 2010).

I/O psychologists have found that satisfaction with work, and with work-life balance, feeds overall satisfaction with life (Bowling et al., 2010). Married men and women who have supportive spouses often enjoy a healthy balance between work and home life, with success in both arenas (Solomon & Jackson, 2014). Moreover, as health psychologists tell us (and as we saw in Module 29), lower job stress, sometimes supported by telecommuting, feeds better health (Allen et al., 2015).

Satisfied employees also contribute to successful organizations. Positive moods at work enhance creativity, persistence, and helpfulness (Ford et al., 2011; Jeffrey et al., 2014; Shockley et al., 2012). Are engaged, happy workers also less often absent? Less likely to quit? Less prone to theft? More punctual? More productive? Statistical digests of prior research have found a modest positive correlation between individual job satisfaction and performance (Judge et al., 2001; Ng et al., 2009; Parker et al., 2003). In one analysis of 4500 employees at 42 British manufacturing companies, the most productive workers were those who found their work environment satisfying (Patterson et al., 2004).

Some organizations seem to have a knack for cultivating more engaged and productive employees. In the United States, *Fortune's* "100 Best Companies to Work For" have also produced markedly higher-than-average returns for their investors (Fulmer et al., 2003). And consider a study of more than 198,000 employees in nearly 8000 business units of 36 large companies (including some 1100 bank branches, 1200 stores, and 4200 teams or departments). James Harter, Frank Schmidt, and Theodore Hayes (2002) explored correlations between various measures of organizational success and *employee engagement*—the extent of workers' involvement, enthusiasm, and identification with their organizations (**Table 82.2**). They found that engaged workers (compared with disengaged workers who are just putting in their time) knew what was expected of them, had what they needed to do their work, felt fulfilled in their work, had regular opportunities to do what they do best, perceived that they were part of something significant, and had opportunities to learn and develop. They also found that business units with engaged employees had more loyal customers, lower turnover rates, higher productivity, and greater profits.

TABLE 82.2 Three Types of Employees

Engaged: working with passion and feeling a profound connection to their company or organization.
Not engaged: putting in the time but investing little passion or energy in their work.
Actively disengaged: unhappy workers undermining what their colleagues accomplish.

Information from Gallup via Crabtree, 2005.

Courtesy of New Lanark Trust

Doing well while doing good—"The Great Experiment" At the end of the 1700s, the New Lanark, Scotland, cotton mill had more than 1000 workers. Many were children drawn from Glasgow's poorhouses. They worked 13-hour days and lived in grim conditions.

On a visit to Glasgow, Welsh-born Robert Owen—an idealistic young cotton-mill manager—chanced to meet and marry the mill owner's daughter. Owen and some partners purchased the mill and on the first day of the 1800s began what he said was "the most important experiment for the happiness of the human race that had yet been instituted at any time in any part of the world" (Owen, 1814). The exploitation of child and adult labor was, he observed, producing unhappy and inefficient workers. Owen showed *transformational leadership* when he undertook numerous innovations: a nursery for preschool children, education for older children (with encouragement rather than corporal punishment), Sundays off, health care, paid sick days, unemployment pay for days when the mill could not operate, and a company store selling goods at reduced prices. He also innovated a goals- and worker-assessment program that included detailed records of daily productivity and costs but with "no beating, no abusive language."

The ensuing commercial success fueled a humanitarian reform movement. By 1816, with decades of profitability still ahead, Owen believed he had demonstrated "that society may be formed so as to exist without crime, without poverty, with health greatly improved, with little if any misery, and with intelligence and happiness increased a hundredfold." Although his utopian vision

> has not been fulfilled, Owen's great experiment laid the groundwork for employment practices that have today become accepted in much of the world.

But what causal arrows explain this correlation between business success and employee morale and engagement? Does success boost morale, or does high morale boost success? In a follow-up longitudinal study of 142,000 workers, researchers found that, over time, employee attitudes predicted future business success (more than the other way around) (Harter et al., 2010). Many other studies confirm that happy workers tend to be good workers (Ford et al., 2011; Seibert et al., 2011; Shockley et al., 2012). One analysis compared companies with top-quartile versus below-average employee engagement levels. Over a three-year period, earnings grew 2.6 times faster for the companies with highly engaged workers (Ott, 2007). It pays to have employees engaged.

Effective Leadership

82-5 How can leaders be most effective?

Great managers support employees' well-being, articulate goals clearly, and lead in ways that suit the situation and consider the cultural context.

Setting Specific, Challenging Goals

Measurable objectives, such as "finish gathering the history paper information by Friday," focus our attention and stimulate us to persist and to be creative. Goals motivate achievement, especially when combined with progress reports (Harkin et al., 2016). For many people, a landmark in time—a special birthday, the new year or new school term, graduation, a new job—spurs personal goal setting (Dai et al., 2014). Action plans that break large goals into smaller steps (subgoals) and that specify "implementation intentions"—when, where, and how to achieve those steps—increase the chances of completing a project on time (Fishbach et al., 2006; Gollwitzer & Sheeran, 2006). Through a task's ups and downs, we best sustain our mood and motivation when we focus on immediate goals (such as daily study) rather than distant goals (such as a class grade).

Better to have our nose to the grindstone than our eye on the ultimate prize (Houser-Marko & Sheldon, 2008).

> “ *The only place success comes before work is in the dictionary.* ”
>
> *Former Green Bay Packers football coach Vince Lombardi*

Thus, before beginning each new edition of this book, our author-editor-staff team *manages by objectives*—we agree on target dates for the completion and editing of each unit draft. If we focus on achieving each of these short-term goals, the prize—an on-time book—takes care of itself. So, to motivate high productivity, effective leaders work with people to define explicit goals, subgoals, and implementation plans, and then provide feedback on progress.

> “ *Good leaders don’t ask more than their constituents can give, but they often ask —and get—more than their constituents intended to give or thought it was possible to give.* ”
>
> *John W. Gardner,* Excellence, *1984*

Choosing an Appropriate Leadership Style

Effective leaders of laboratory groups, work teams, and large corporations often exude *charisma* (Goethals & Allison, 2014; House & Singh, 1987; Shamir et al., 1993). People with charisma have the ability to motivate people to cooperate toward a common goal (Grabo & van Vugt, 2016). Although charismatic leaders can inspire, **leadership**—the ability to motivate and influence people to enable their group’s success—varies, depending both on the leader and the situation. In some situations (think of a commander leading troops into battle), a *directive* style may be needed (Fiedler, 1981). In other situations—developing a comedy show, for example—a leader might get better results using a *democratic* style that welcomes team member creativity.

leadership
an individual’s ability to motivate and influence others to contribute to their group’s success.

Leaders differ in the personal qualities they bring to the job. Some excel at **task leadership**—by setting standards, organizing work, and focusing attention on goals. To keep the group centered on its mission, task leaders typically use a directive style, which can work well if the leader gives good directions (Fiedler, 1987).

task leadership
goal-oriented leadership that sets standards, organizes work, and focuses attention on goals.

Other managers excel at **social leadership**. They explain decisions, help group members solve their conflicts, and build teams that work well together (Evans & Dion, 1991; Pfaff et al., 2013). Social leaders, many of whom are women, often have a democratic style. They share authority and welcome team members’ opinions. Social leadership and team-building increases morale and productivity (Shuffler et al., 2011, 2013). We usually feel more satisfied and motivated, and perform better, when we can participate in decision making (Cawley et al., 1998; Pereira & Osburn, 2007). Moreover, when members are sensitive to one another and participate equally, groups solve problems with greater “collective intelligence” (Woolley et al., 2010).

social leadership
group-oriented leadership that builds teamwork, mediates conflict, and offers support.

In one study of 50 Dutch companies, the firms with the highest morale had chief executives who most inspired their colleagues "to transcend their own self-interests for the sake of the collective" (de Hoogh et al., 2004). *Transformational leadership* of this kind motivates others to identify with and commit themselves to the group's mission. Transformational leaders, many of whom are natural extraverts, articulate high standards, inspire people to share their vision, and offer personal attention (Bono & Judge, 2004). The frequent result is more engaged, trusting, and effective workers (Turner et al., 2002). Women more than men tend to exhibit transformational leadership qualities. Alice Eagly (2007, 2013) believes this helps explain why companies with female top managers have tended to enjoy superior financial results, even after controlling for such variables as company size.

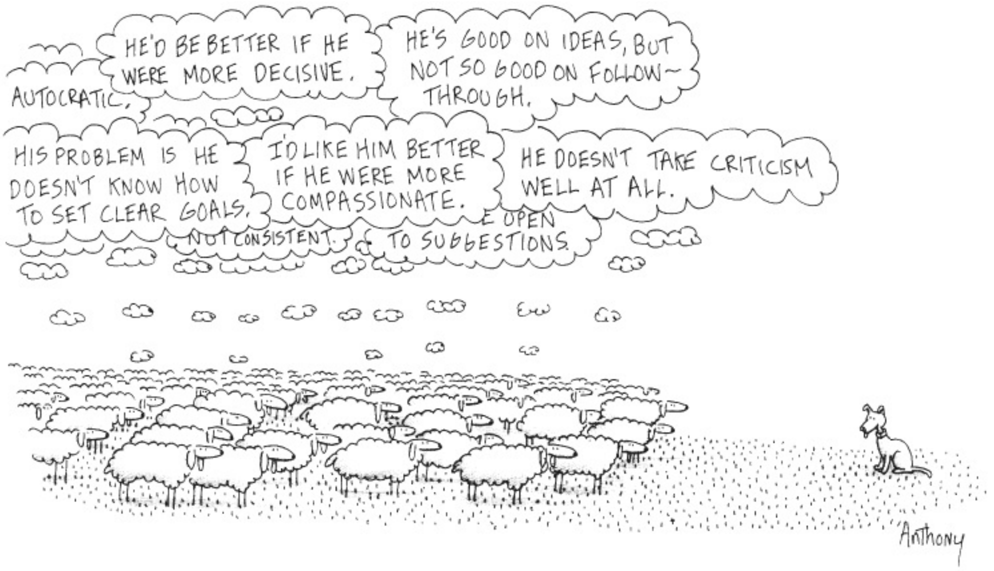
Scott Eklund/AP Images

The power of positive coaching Football coach Pete Carroll, who led the University of Southern California to two national championships and the Seattle Seahawks to a Super Bowl championship, has combined positive enthusiasm and fun workouts with "a commitment to a nurturing environment that allows people to be themselves while still being accountable to the team" (Trotter, 2014). "It shows you can win with positivity," noted Seahawks star defensive player Richard Sherman. "It's literally all positive reinforcement," said teammate Jimmy Graham (Belson, 2015).

Studies in India, Taiwan, and Iran suggest that effective managers—whether in coal mines, banks, or government offices—often exhibit a high degree of *both* task and social leadership (Smith & Tayeb, 1989). As achievement-minded people, effective managers care about how well work is done, yet they are sensitive to their subordinates' needs. Workers in family-friendly organizations that offer flexible-time hours report feeling greater job satisfaction and loyalty to their employers (Butts et al., 2013; Roehling et al., 2001). Over time, U.S. senators who practice common virtues (humility, wisdom, courage) become more influential in leadership roles than do those who practice manipulation and intimidation (ten Brinke et al., 2016). Social virtues work.

POSITIVE REINFORCEMENT Effective leadership often builds on a basic principle of *operant conditioning:* To teach a behavior, catch a person doing something right and reinforce it. It sounds simple, but many managers are like parents who, when a child brings home a near-perfect school report card, focus on the one low grade in a troublesome biology class and ignore the rest. "Sixty-five percent of Americans received NO praise or recognition in the workplace last year," reported the Gallup Organization (2004).

FULFILLING THE NEED TO BELONG A work environment that satisfies employees' need to belong is energizing. Employees who enjoy high-quality colleague relationships engage their work with more vigor (Carmeli et al., 2009). Gallup researchers have asked more than 15 million employees worldwide if they have a "best friend at work." The 30 percent who do "are *seven times* as likely to be engaged in their jobs" as those who don't, report Tom Rath and James Harter (2010). And, as we noted earlier, positive, engaged employees are a mark of thriving organizations.


HE'D BE BETTER IF HE WERE MORE DECISIVE.
HE'S GOOD ON IDEAS, BUT NOT SO GOOD ON FOLLOW-THROUGH.
AUTOCRATIC.
HIS PROBLEM IS HE DOESN'T KNOW HOW TO SET CLEAR GOALS.
I'D LIKE HIM BETTER IF HE WERE MORE COMPASSIONATE.
HE DOESN'T TAKE CRITICISM WELL AT ALL.
NOT CONSISTENT.
OPEN TO SUGGESTIONS.
Anthony

The New Yorker Collection, 1988, Anthony Taber from cartoonbank.com. All Rights Reserved.

PARTICIPATIVE MANAGEMENT Employee participation in decision making is common in Sweden, Japan, the United States, and elsewhere (Cawley et al., 1998; Sundstrom et al., 1990). Workers given a chance to voice their opinion and be part of the decision-making process have responded more positively to the final decision (van den Bos & Spruijt, 2002). They also feel more empowered and are likely, therefore, to be more creative and committed (Hennessey & Amabile, 2010; Seibert et al., 2011).

The ultimate in employee participation is the employee-owned company. One such company in my [DM's] town is the Fleetwood Group—a thriving 165-employee manufacturer of educational furniture and wireless electronic clickers. Every employee owns part of the company, and as a group they own 100 percent. The more years employees work, the more they own, yet no one owns more than 5 percent. Like every corporate president, Fleetwood's president works for his stockholders—who also just happen to be his employees.

As a company that endorses faith-inspired *servant leadership* and "respect and care for each team member-owner," Fleetwood is free to place people above profits. Thus, when orders lagged during a recession, the employee-owners decided that job security meant more to them than profits. So the company paid otherwise idle workers to do community service, such as answering phones at nonprofit agencies and building

Habitat for Humanity houses. Employee ownership attracts and retains talented people, which for Fleetwood has meant company success.

Cultural Influences on Leadership Styles

82-6 What cultural influences need to be considered when choosing an effective leadership style?

Industrial-organizational psychology sprang from North American roots. So, how well do its leadership principles apply to cultures worldwide?

Investigators worldwide have undertaken Project GLOBE (Global Leadership and Organizational Behavior Effectiveness), to study cultural variations in leadership expectations (House et al., 2001). Some cultures, for example, encourage collective sharing of resources and rewards; others are more individualist. Some cultures minimize and others accentuate traditional gender roles. Some cultures prioritize being friendly, caring, and kind, and others encourage aggressiveness. The program’s first research phase studied 17,300 leaders of 950 organizations in 61 countries (Brodbeck et al., 2008; Dorfman et al., 2012). One finding: Leaders who fulfill expectations, such as by being directive in some cultures or participative in others, tend to be successful. Cultures shape leadership and what makes for leadership success.

Nevertheless, some leader behaviors are universally effective. From its massive study of nearly 50,000 business units in 45 countries, the Gallup Organization observed that thriving companies tend to focus on identifying and enhancing employee *strengths* (rather than punishing their deficiencies). Doing so predicts increased employee engagement, customer satisfaction, and profitability (Rigoni & Asplund, 2016a,b). “Strengths-based” leadership pays dividends. By caring about their employees and engaging and affirming their strengths, such leaders support happier, more creative, more productive workers with less absenteeism and turnover (Amabile & Kramer, 2011; De Neve et al., 2013). Moreover, the same principles affect college student satisfaction, retention, and future success (Larkin et al., 2013; Ray & Kafka, 2014). Students who feel supported by caring friends and mentors, and engaged in their campus life, tend to persist and ultimately succeed during school and after graduation.

* * *

We have considered *personnel psychology* (the I/O psychology subfield that focuses on training job seekers and assisting with employee selection, placement, appraisal, and development). And we have considered *organizational psychology* (the I/O psychology subfield that focuses on worker satisfaction and productivity, and on organizational change). Finally, we turn to *human factors psychology*, which explores the human-machine interface.

✓ Check Your Understanding

Ask Yourself

- How might you use what you've learned about effective goal-setting to achieve more in your own life?

Test Yourself

- What are the two basic types of leadership, and how do the most effective managers employ these leadership strategies?
- What characteristics are important for transformational leaders?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Human Factors Psychology

82-7 How do human factors psychologists work to create user-friendly machines and work settings?

Designs sometimes neglect the human factor. Cognitive scientist Donald Norman (2001) bemoaned the complexity of assembling his new HDTV, related components, and seven remotes into a usable home theater system: “I was VP of Advanced Technology at Apple. I can program dozens of computers in dozens of languages. I understand television, really, I do. . . . It doesn’t matter: I am overwhelmed.”

Human factors psychologists work with designers and engineers to tailor appliances, machines, and work settings to our natural perceptions and inclinations. Bank ATM machines are internally more complex than remote controls ever were, yet thanks to human factors engineering, ATMs are easier to operate. Digital recorders have solved the TV recording problem with a simple select-and-click menu system (“record that one”). Apple similarly engineered easy usability with the iPhone and iPad. Handheld and wearable technologies are increasingly making use of *haptic* (touch-based) feedback—opening a phone with a thumbprint, sharing your heartbeat via a smartwatch, or having GPS directional instructions (“turn left” arrow) “drawn” on your skin with other wrist-worn devices.

Norman hosts a website (jnd.org) that illustrates good designs that fit people (**Figure 82.3**). Human factors psychologists also help design efficient environments. An ideal kitchen layout, researchers have found, puts needed items close to their usage point and near eye level. It locates work areas to enable doing tasks in order, such as placing the refrigerator, stove, and sink in a triangle. It creates counters that enable hands to work at or slightly below elbow height (Boehm-Davis, 2005).

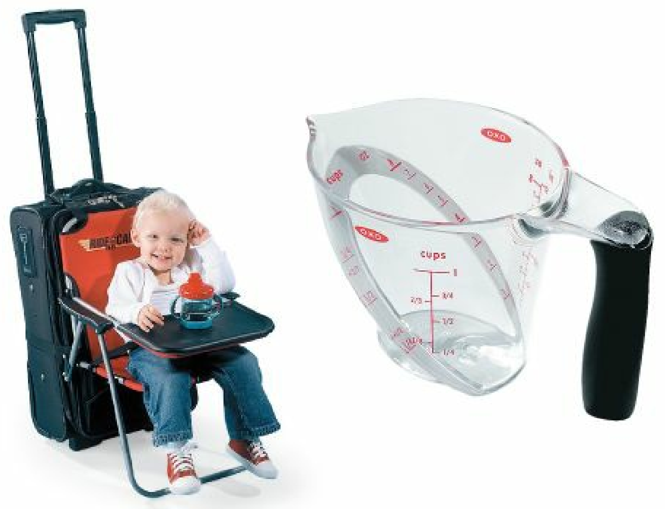


Figure 82.3
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018
Worth Publishers
Left: Ride On Carry On; Right: OXO Good Grips

Figure 82.3 Designing products that fit people

Human factors expert Donald Norman offers these and other examples of effectively designed products. The Ride On Carry On foldable chair attachment, “designed by a flight attendant mom,” enables a small suitcase to double as a stroller. The Oxo measuring cup allows the user to see the quantity from above.

Understanding human factors can help prevent accidents. By studying the human factor in driving accidents, psychologists seek to devise ways to reduce the distractions, fatigue, and inattention that contribute to 1.25 million annual worldwide traffic fatalities (WHO, 2016). At least two-thirds of commercial air accidents have been caused by human error (Shappell et al., 2007). After beginning commercial flights in the 1960s, the Boeing 727 was involved in several landing accidents caused by pilot error. Psychologist Conrad Kraft (1978) noted a common setting for these accidents: All took place at night, and all involved landing short of the runway after crossing a dark stretch of water or unilluminated ground. Kraft reasoned that, on rising terrain, city lights beyond the runway would project a larger retinal image, making the ground seem farther away than it was. By re-creating these conditions in flight simulations, Kraft discovered that pilots were deceived into thinking they were flying higher than their actual altitudes (**Figure 82.4**). Aided by Kraft’s finding, the airlines began requiring the co-pilot to monitor the altimeter—calling out altitudes during the descent—and the accidents diminished.

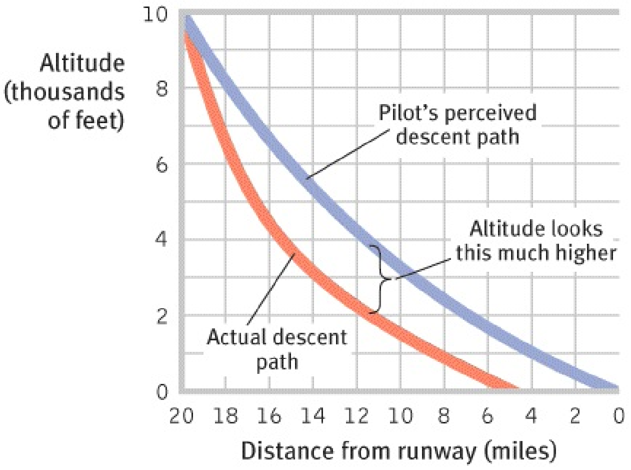


Figure 82.4
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Kraft, 1978.

Figure 82.4 The human factor in accidents

Lacking distance cues when approaching a runway from over a dark surface, pilots simulating a night landing tended to fly too low.

Human factors psychologists can also help us to function in other settings. Consider the available assistive listening technologies in various theaters, auditoriums, and places of worship. One technology, commonly available in the United States, requires a headset attached to a pocket-sized receiver. The well-meaning people who provide these systems correctly understand that the technology puts sound directly into the user’s ears. Alas, few people with hearing loss elect the hassle and embarrassment of locating, requesting, wearing, and returning a conspicuous headset. Most such units therefore sit in closets. Britain, the Scandinavian countries, Australia, and now many parts of the United States have instead installed *loop systems* (see hearingloop.org) that broadcast customized sound directly through a person’s own hearing aid. When suitably equipped, a hearing aid can be transformed by a discreet touch of a switch into a customized in-the-ear speaker. When offered convenient, inconspicuous, personalized sound, many more people elect to use assistive listening.

Designs that enable safe, easy, and effective interactions between people and technology often seem obvious after the fact. Why, then, aren't they more common? Technology developers, like all of us, sometimes mistakenly assume that others share their expertise—that what's clear to them will similarly be clear to others (Camerer et al., 1989; Nickerson, 1999). When people rap their knuckles on a table to convey a familiar tune (try this with a friend), they often expect their listener to recognize it. But for the listener, this is a near-impossible task (Newton, 1991). When you know a thing, it's hard to mentally simulate what it's like not to know, and that is called the *curse of knowledge.*

Steven Day/AP Images

The human factor in safe landings Advanced cockpit design and rehearsed emergency procedures aided pilot Chesley "Sully" Sullenberger, a U.S. Air Force Academy graduate who earned a Master's degree in industrial psychology. In 2009, Sullenberger's instantaneous decisions safely guided his disabled airplane onto New York City's Hudson River, where all 155 of the passengers and crew were safely evacuated.

> “*The better you know something, the less you remember about how hard it was to learn.*”
>
> *Psychologist Steven Pinker,* The Sense of Style, *2014*

The point to remember: Everyone benefits when designers and engineers tailor machines, technologies, and environments to fit human abilities and behaviors, when they user-test their work before production and distribution, and when they remain mindful of the curse of knowledge.

✓ Check Your Understanding

Ask Yourself

- What situations have you experienced (using new technology, visiting new or remodeled building spaces, taking various modes of transportation) where the design did not work well? What situations have you experienced in which planners did a particularly good job matching machines and physical environments to our abilities and expectations?

Test Yourself

- What is the *curse of knowledge*, and what does it have to do with the work of human factors psychologists?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 82 REVIEW

82-1 What is *flow*?

- *Flow* is a completely involved, focused state of consciousness with diminished awareness of self and time. It results from fully engaging one's skills.

82-2 What are three key areas of study related to industrial-organizational psychology?

- I/O psychology's three subfields are *personnel, organizational,* and *human factors* psychology.

82-3 How do personnel psychologists facilitate job seeking, employee selection, work placement, and performance appraisal?

- Personnel psychologists work with job seekers to improve their searching and self-presentation skills, and with organizations to devise selection methods for new employees, recruit and evaluate applicants, design and evaluate training programs, identify people's strengths, analyze job content, and appraise individual and organizational performance.
- Unstructured interviews foster the interviewer illusion; *structured interviews* pinpoint job-relevant strengths and are better predictors of performance.
- Checklists, graphic rating scales, and behavior rating scales are useful performance appraisal methods.

82-4 What is the role of organizational psychologists?

- Organizational psychologists examine influences on worker satisfaction and productivity and facilitate organizational change. Employee satisfaction and engagement tend to correlate with organizational success.

82-5 How can leaders be most effective?

- Effective leaders set specific challenging goals and choose an appropriate leadership style. Leadership style may be goal-oriented *(task leadership)*, group-oriented *(social leadership)*, or some combination of the two.

82-6 What cultural influences need to be considered when choosing an effective leadership style?

- Leaders who fulfill their culture’s expectations—by promoting individualism or collectivism, kindness or aggressiveness, or the accentuating or downplaying of gender roles—tend to be successful.
- Other leader behaviors—such as supporting employees by focusing on their strengths—are universally effective.

82-7 How do human factors psychologists work to create user-friendly machines and work settings?

- Human factors psychologists contribute to human safety and improved design by encouraging developers and designers to consider human perceptual abilities, to avoid the curse of knowledge, and to test users to reveal perception-based problems.

Multiple-Choice Questions

1. Carla is reading a gripping novel and loses track of time, making her late for practice. Carla may have been experiencing

a. flow.
b. I/O psychology.
c. self-efficacy.

d. performance appraisal.
e. the curse of knowledge.

2. Job-seekers at a company are screened by different interviewers, but each is asked the same questions. The company is making use of

a. flow.
b. structured interviews.
c. employee engagement.
d. unstructured interviews.
e. human factors psychology.

3. The overall goal of 360-degree feedback is

a. self-rating.
b. achieving flow.
c. performance appraisal.
d. employee selection.
e. achieving transformational leadership.

Practice FRQ

1. Compare and contrast the type of work done by the following psychologists:

- Organizational
- Human factors
- Personnel

(3 points)

Module **83 Animal Thinking and Language**

LEARNING TARGETS

- **83-1 Discuss what we know about thinking in other species.**
- **83-2 Discuss what we know about other species' capacity for language.**

Do Other Species Share Our Cognitive Skills?

83-1 What do we know about thinking in other species?

Other animals are surprisingly smart (de Waal, 2016) (**Figure 83.1**). In her 1908 book, *The Animal Mind*, pioneering psychologist Margaret Floy Washburn argued that animal consciousness and intelligence can be inferred from their behavior. In 2012, neuroscientists convening at the University of Cambridge added that animal consciousness can also be inferred from their brains: “Nonhuman animals, including all mammals and birds,” possess the neural networks “that generate consciousness” (Low, 2012). Consider, then, what animal brains can do. Module 34 described animals displaying insight, but here are some other animal tricks.

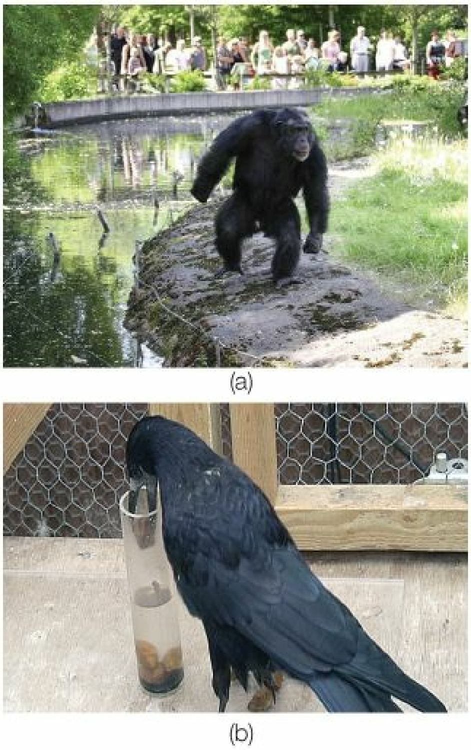


Figure 83.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
(a) Neurology/PA/AP Photo; (b) Chris Bird & Nathan Emery

Figure 83.1 Animal talents

(a) One male chimpanzee in Sweden’s Furuvik Zoo was observed every morning collecting stones into a neat little pile, which later in the day he used as ammunition to pelt visitors (Osvath & Karvonen, 2012). (b) Crows studied by Christopher Bird and Nathan Emery (2009) quickly learned to raise the water level in a tube and nab a floating worm by dropping in stones. Other crows have used twigs to probe for insects, and bent strips of metal to reach food.

Using Concepts and Numbers

By touching screens in quest of a food reward, black bears have learned to sort pictures into animal and nonanimal categories, or concepts (Vonk et al., 2012). Chimpanzees, gorillas, and monkeys also form concepts, such as *cat* and *dog*. After monkeys have learned these concepts, certain frontal lobe neurons in their brain fire in response to new “cat-like” images, others to new “dog-like” images (Freedman et al., 2001). Even pigeons—mere birdbrains—can sort objects (pictures of cars, cats, chairs, flowers) into categories. Shown a picture of a never-before-seen chair, pigeons will reliably peck a key that represents *chairs* (Wasserman, 1995).

Transmitting Culture

Like humans, other species invent behaviors and transmit cultural patterns to their observing peers and offspring (Boesch-Achermann & Boesch, 1993). Forest-dwelling chimpanzees select different tools for different purposes—a heavy stick for making holes, a light, flexible stick for fishing for termites, a pointed stick for roasting marshmallows. (Just kidding: They don’t roast marshmallows, but they have surprised us with their sophisticated tool use [Sanz et al., 2004]). Researchers have found at least 39 local customs related to chimpanzee tool use, grooming, and courtship (Claidière & Whiten, 2012; Whiten & Boesch, 2001). One group may slurp termites directly from a stick, another group may pluck them off individually. One group may break nuts with a stone hammer, while their neighbors use a wooden hammer. One chimpanzee discovered that tree moss could absorb water for drinking from a waterhole, and within six days seven other observant chimpanzees began doing the same (Hobaiter et al., 2014). These transmitted behaviors, along with differing communication and hunting styles, are the chimpanzee version of cultural diversity.

Several experiments have brought chimpanzee and baboon cultural transmission into the laboratory (Claidière et al., 2014; Horner et al., 2006). If Chimpanzee A obtains food either by sliding or by lifting a door, Chimpanzee B will then typically do the same to get food. And so will Chimpanzee C after observing Chimpanzee B. Across a chain of six animals, chimpanzees see, and chimpanzees do.

Other Cognitive Skills

Mike Lovett

Animal cognition in action Until his death in 2007, Alex, an African Grey parrot, categorized and named objects (Pepperberg, 2009, 2012, 2013). Among his jaw-dropping numerical skills was the ability to comprehend numbers up to 8. He could speak the number of objects. He could add two small clusters of objects and announce the sum. He could indicate which of two numbers was greater. And he gave correct answers when shown various groups of objects. Asked, for example, “What color four?” (meaning “What’s the color of the objects of which there are four?”), he could speak the answer.

A baboon in an 80-member troop can distinguish every other member’s voice (Jolly, 2007). Great apes, dolphins, and elephants recognize themselves in a mirror, demonstrating self-awareness. Dolphins form coalitions, cooperatively hunt, and learn tool use from one another (Bearzi & Stanford, 2010). In Shark Bay, Western Australia, a small group of dolphins learned to use marine sponges as protective nose guards when probing the sea floor for fish (Krützen et al., 2005). Elephants also display their abilities to learn, remember, discriminate smells, empathize, cooperate, teach, and spontaneously use tools (Byrne et al., 2009).

Chimpanzees show altruism, cooperation, and group aggression. Like humans, they will purposefully kill their neighbor to gain land, and they grieve over dead relatives (Anderson et al., 2010; Biro et al., 2010; Mitani et al., 2010).

* * *

There is no question that other species display many remarkable cognitive skills. But one big question remains: Do they, like humans, exhibit language?

Do Other Species Have Language?

83-2 What do we know about other species' capacity for language?

Humans have long and proudly proclaimed that language sets us above all other animals. "When we study human language," asserted linguist Noam Chomsky (1972), "we are approaching what some might call the 'human essence,' the qualities of mind that are, so far as we know, unique [to humans]." Let's see if research on animal language supports claims that humans, alone, have language.

Some animals display basic language processing. Pigeons can learn the difference between words and nonwords, but they could never read this book (Scarf et al., 2016). Other animals show impressive comprehension and communication. Various monkey species sound different alarm cries for different predators, such as a barking call for a leopard, a cough for an eagle, and a chuttering for a snake. Hearing the leopard alarm, vervets climb the nearest tree. Hearing the eagle alarm, they rush into the bushes. Hearing the snake chutter, they stand up and scan the ground (Byrne, 1991; Clarke et al., 2015; Coye et al., 2015). To indicate such things as a type of threat—an eagle, a leopard, a falling tree, a neighboring group—monkeys will combine 6 different calls into a 25-call sequence (Balter, 2010). But are such communications language?

Jim Cummins/Getty Images

Talking hands Human language appears to have evolved from gestured communications (Corballis, 2002, 2003; Pollick & de Waal, 2007). Even today, gestures are naturally associated with spontaneous speech, and similarly so for blind and sighted speakers of a given language (Özçaliskan et al., 2016). Both gesture and speech communicate, and when they convey the same rather than different information (as they do in baseball's sign language), we humans understand faster and more accurately (Hostetter, 2011; Kelly et al., 2010). Outfielder William Hoy, the first deaf player to join the major leagues (1892), reportedly helped invent hand signals for “Strike!” “Safe!” (shown here) and “Yerr out!” (Pollard, 1992). Referees in all sports now use invented signs, and fans are fluent in sports sign language.

In the late 1960s, psychologists Allen Gardner and Beatrix Gardner (1969) aroused enormous scientific and public interest with their work with Washoe, a young chimpanzee. Building on chimpanzees’ natural tendencies for gestured communication, they taught Washoe sign language. After four years, Washoe could use 132 signs; by her life’s end in 2007, she was using 250 signs (Metzler, 2011; Sanz et al., 1998).

During the 1970s, more and more reports came in. Some chimpanzees were stringing signs together to form sentences. Washoe, for example, signed “You me go out, please.” Some word combinations seemed creative—saying *water bird* for “swan” or *apple-which-is-orange* for “orange” (Patterson, 1978; Rumbaugh, 1977).

But by the late 1970s, other psychologists were growing skeptical. Were the chimps language champs or were the researchers chumps? Consider, said the skeptics:

- Ape vocabularies and sentences are simple, rather like those of a 2-year-old child. And apes gain their limited vocabularies only with great difficulty (Wynne, 2004, 2008). Speaking or signing children can easily soak up dozens of new words each week, and 60,000 by adulthood.
- Chimpanzees can make signs or push buttons in sequence to get a reward. But pigeons, too, can peck a sequence of keys to get grain (Straub et al., 1979). The apes’ signing might be nothing more than aping their trainers’ signs and learning that certain arm movements produce rewards (Terrace, 1979).
- When information is unclear, we are prone to *perceptual set*—a tendency to see what we want or expect to see (Module 17). Interpreting chimpanzee signs as language may have been little more than the trainers’ wishful thinking (Terrace, 1979). When Washoe signed *water bird*, she may have been separately naming *water* and *bird*.

- “Give orange me give eat orange me eat orange . . .” is a far cry from the exquisite syntax of a 3-year-old (Anderson, 2004; Pinker, 1995). Rules of syntax in human language govern the order of words in sentences, so to a child, “You tickle” and “Tickle you” communicate different ideas. A chimpanzee, lacking these rules of syntax, might use the same sequence of signs for both phrases.

Susanne Baus/AFP/Getty Images/Newscom

Comprehending canine Border collie Rico had a vocabulary of 200 human words. If asked to retrieve a toy with a name he had never heard, Rico would pick out a new toy from a group of familiar items (Kaminski et al., 2004). Hearing that name for the second time four weeks later, Rico more often than not would retrieve the same toy. Another border collie, Chaser, has set an animal record by learning more than 1000 object names (Pilley, 2013). Like a 3-year-old child, she can also categorize them by function and shape. She can “fetch a ball” or “fetch a doll.”

Controversy can stimulate progress, and in this case, it triggered more evidence of chimpanzees’ abilities to think and communicate. One surprising finding was that Washoe trained her adopted son Loulis to use the signs she had learned. After her second infant died, Washoe became withdrawn when told, “Baby dead, baby gone, baby finished.” Two weeks later, researcher-caretaker Roger Fouts (1992, 1997) signed better news: “I have baby for you.” Washoe reacted with instant excitement. Hair on end, she swaggered and panted while signing over and again, “Baby, my baby.” It took several hours for the foster mom and infant to warm to each other, but then Washoe broke the ice by signing, “Come baby” and cuddling Loulis. Without human assistance, Loulis eventually picked up 68 signs, simply by observing Washoe and three other language-trained chimps signing together.

Even more stunning was a later report: Kanzi, a bonobo with a reported 384-word vocabulary, could understand syntax in spoken English (Savage-Rumbaugh et al., 1993, 2009). Kanzi, who appears to have the receptive language ability of a human 2-year-old, has responded appropriately when asked, “Can you show me the light?” and “Can you bring me the [flash]light?” and “Can you turn the light on?” Given stuffed animals and asked—for the first time—to “make the dog bite the snake,” he put the snake to the dog’s mouth.

Paul Fusco/Magnum

But is this language? Chimpanzees’ ability to express themselves in American Sign Language (ASL) raises questions about the very nature of language. Here, the trainer is asking, “What is this?” The sign in response is “Baby.” Does the response constitute language?

So, how should we interpret such studies? Are humans the only language-using species? If by *language* we mean an ability to communicate through a meaningful sequence of symbols, then apes are indeed capable of language. But if we mean a verbal or signed expression of complex grammar, most psychologists would now agree that humans alone possess language. Moreover, 2½-year-old children display some cognitive abilities, such as following an actor’s gaze to a target, that are unmatched even by chimpanzees (Herrmann et al., 2010). Humans, alone, also have a version of a gene *(FOXP2)* that helps enable the lip, tongue, and vocal cord movements of human speech (Lieberman, 2013). Humans with a mutated form of this gene have difficulty speaking words.

One thing is certain: Studies of animal language and thinking have moved psychologists toward a greater appreciation of other species’ remarkable abilities (Friend, 2004; Rumbaugh & Washburn, 2003; Wilson et al., 2015). In the past, many psychologists doubted that other species could plan, form concepts, count, use tools, or show compassion (Thorpe, 1974). Today, thanks to animal researchers, we know better. Other species exhibit insight, show family loyalty, communicate with and care for one another, and transmit cultural patterns across generations. Working out what this means for the moral rights of other animals is an unfinished task.

✓ Check Your Understanding

Ask Yourself

- Can you think of a time when you felt an animal was communicating with you? How might you put such intuition to a test?

Test Yourself

- If your dog barks at a stranger at the door, does this qualify as language? What if the dog yips in a telltale way to let you know she needs to go out?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 83 REVIEW

83-1 What do we know about thinking in other species?

- Researchers make inferences about other species' consciousness and intelligence based on behavior. The main focus of such research has been the great apes, but other species have also been studied.
- Evidence to date shows that other species can use concepts, numbers, and tools, and they can transmit learning from one generation to the next (cultural transmission). They also show insight, self-awareness, altruism, cooperation, and grief.

83-2 What do we know about other species' capacity for language?

- A number of great apes (mostly chimpanzees) have learned to communicate with humans by signing or by pushing buttons, have developed vocabularies of nearly 400 words, have communicated by stringing these words together, have taught their skills to younger animals, and have shown some understanding of syntax.
- While only humans communicate in complex sentences, primates' and other animals' impressive abilities to think and communicate challenge humans to consider what this means about the moral rights of other species.

Multiple-Choice Questions

1. Which of the following is an example of an animal using concepts?

a. A parrot identifies the number and color of objects.
b. A dog identifies the scent of her owner.
c. A parrot learns to say phrases.
d. A dog fetches a thrown stick.
e. A parrot quiets when the cover is put over his cage at night.

2. Researchers have found that groups of animals will share certain customs, such as ways of using tools. This is an example of

a. self-awareness.
b. altruism.
c. cultural transmission.
d. insight.
e. language use.

Practice FRQ

1. Provide a specific example from the text of animal thinking, animal tool use, and animal language.

(3 points)

ENRICHMENT MODULES **REVIEW**

KEY TERMS AND CONCEPTS TO REMEMBER

flow, p. 833
industrial-organizational (I/O) psychology, p. 835
personnel psychology, p. 835
organizational psychology, p. 835
human factors psychology, p. 835
structured interviews, p. 838
leadership, p. 842
task leadership, p. 842
social leadership, p. 842

Appendix A: Practice AP®-Style Exam

1. The Big Five model suggests that people can be rated along the dimensions of conscientiousness, agreeableness, neuroticism, openness, and extraversion. This theory is best associated with which of the following?

a. Trait theory
b. Psychodynamic theory
c. The cognitive approach
d. The humanistic approach
e. The biological approach

2. Warren has a bacterial infection that has affected the ability of the rods in his eyes to function correctly. This should have the greatest impact on which of the following?

a. Visual clarity
b. Peripheral vision
c. Color vision
d. Hearing high-frequency sounds
e. Hearing low-frequency sounds

3. Seeking out information that supports our previously held beliefs, while discounting information that questions those beliefs, is an obstacle to problem solving known as

a. functional fixedness.

b. a logical fallacy.
c. overconfidence.
d. mental set.
e. confirmation bias.

4. Joe is taking a new job on the night shift next week. His supervisors have informed him that initially he may have some problems with his level of alertness and his memory as he adjusts to his new schedule. Joe's supervisors are sharing with Joe their knowledge of

a. circadian rhythms.
b. REM sleep.
c. sleep spindles.
d. the social clock.
e. NREM sleep.

5. A researcher who is trying to determine how social-cultural changes might be correlated with the incidence of bipolar disorder would be most interested in which of the following?

a. The brain changes in a person with bipolar disorder as measured by a PET scan
b. Scientific measures of the heritability of the disorder
c. The correlation between rates of poverty and cases of the disorder
d. Neurotransmitter levels in patients diagnosed with the disorder
e. The number of close biological relatives who also suffer from bipolar disorder

6. Zeina cocked her head to the side immediately when she heard the fire truck's siren. Turning her head enabled each ear to detect a slightly different intensity of sound, thus enabling her to determine the siren's

a. timbre.
b. pitch.
c. frequency.
d. location.
e. tone.

7. A police officer questions a child who was an eyewitness to a crime. The officer is most likely to get accurate information if she:

a. first tells the child all about the crime the way she thinks it unfolded.
b. uses neutral, age-appropriate words and is the first to interview the child.
c. uses neutral, age-appropriate words and is the last to interview the child.
d. uses suggestive techniques to get the story from the child.
e. tells the child a story about a similar crime to get the child thinking about possibly similar details.

8. People diagnosed with OCD experience compulsions. Which of the following is a compulsion?

a. Renee persistently thinks about the possible death of her loved ones.
b. Eric frequently worries that there may be germs on his hands.
c. Brianna has an ongoing worry that she might have left the oven on at home.
d. Stefan often feels great anxiety if things are not in exact order in his room.
e. Tyrik flips the light switch on and off seven times every evening when he walks in the front door.

9. When a person performs a heroic act solely for public praise, she is on which developmental level according to Lawrence Kohlberg?

a. Preconventional
b. Postconventional
c. Conventional
d. Concrete operational
e. Formal operational

0. The bus driver was surprised when her first passenger asked her to turn the music down, because she thought the volume was fine. When the passenger said something, and the driver could barely hear the person, the driver realized the music was too loud. Which of the following statements best explains the driver’s initial indifference to the music volume?

a. The initial music volume was below her absolute threshold.
b. The driver had a decreased ability to determine the music’s pitch.
c. The just noticeable difference of the music was too great.
d. The driver had adapted to the initial volume of the music.
e. The driver was using bottom-up processing instead of top-down processing.

1. A rat jumps each time it sees a green light flash, because the green light has always appeared just before an electric shock. In classical conditioning, the initial learning of the connection between the light and the shock is referred to as

a. spontaneous recovery.
b. extinction.
c. generalization.
d. accommodation.
e. acquisition.

2. Which of the following examples is the best illustration of cognitive dissonance?

a. The cult member who admires the leader of his group and follows the leader without doubt
b. The teacher who reprimands a student who she feels could do much better academically
c. The soldier who receives orders from a superior to do something that violates his personal moral beliefs
d. The librarian who dreams of returning to graduate school to become a professor
e. The student who gives up trying to master calculus because it seems too hard

3. At their high school reunion, many attendees recalled exactly where they were 20 years before when they realized the school was on fire.

Strong memories of an emotionally significant moment are referred to as

a. flashbulb memories.
b. state-dependent memories.
c. short-term memories.
d. sensory memories.
e. critical period memories.

4. Of the following, for *which* pair are both used to reveal activity in a person’s brain?

a. CT scan and PET scan
b. X-ray and fMRI
c. fMRI and MRI
d. PET scan and fMRI
e. CT scan and MRI

5. A therapist who believes in giving patients positive reinforcement when they behave appropriately is most likely to use which of the following techniques?

a. Systematic desensitization
b. Token economy
c. Aversive conditioning
d. Transference
e. Exposure therapy

6. Phil complained to his doctor that the sleeping pill the doctor previously prescribed no longer was effective at the original dosage. To his doctor’s dismay, Phil confided that he had been taking more than the recommended amount of the drug to get the same effect. Phil’s increasing intake of the drug reflects the condition known as

a. withdrawal.
b. sensory overload.
c. tolerance.
d. catharsis.

e. REM rebound.

7. Students who have recently learned “correlation does not equal causation” should be most cautious of the findings in which news headline below?

a. “Coffee drinkers live longer, surveys say.”
b. “101-year-old man still healthy and happy.”
c. “Flu shots lower the risk of infection by 87 percent in lab studies.”
d. “Skim milk consumption tied to decreased neuron growth in studies of mice.”
e. “Observers note men less likely than women to wash their hands in public restrooms.”

8. The symptoms of schizophrenia can be categorized as positive or negative. Which of the following symptoms can be considered positive?

a. Hallucinations
b. Flat affect
c. Social withdrawal
d. Catatonia
e. Toneless vocal patterns

9. Mary Ainsworth designed the “strange situation” experiment in order to determine

a. how creative young children could be in novel environments.
b. whether children had developed a secure attachment to their mother.
c. if children were more motivated by social anxiety than by peer pressure.
d. if the parenting style of mothers affected their children’s temperament.
e. if early signs of imprinting in young children could be reversed.

0. A principal wants to avoid the vandalism and inappropriate behavior that occurred at last year’s Halloween dance. So, this year she decides to increase the lighting in the parking lots, ban students from wearing masks over their faces, and increase the number of video cameras near the gym. These ideas are most closely linked to the principle of

a. group polarization.
b. social facilitation.
c. superordinate goals.
d. deindividuation.
e. minority influence.

1. Longitudinal studies suggest that certain characteristics, such as reactivity and intensity, appear early in life and remain stable from childhood into adulthood. Psychologists use what term to refer to these aspects of personality?

a. Schema
b. Reflex
c. Temperament
d. Fixation
e. Sensory adaptation

2. One way to determine if infants can perceive a certain stimulus is to measure how long they gaze at the item before looking away. Psychologists use what term to refer to the concept that infants tend to decrease their rate of responding when a stimulus is repeated and no longer novel?

a. Sensory adaptation
b. Infantile amnesia
c. Perceptual set
d. Perceptual constancy
e. Habituation

3. An injury that leads to the loss of binocular vision would have the greatest impact on

a. visual acuity.
b. color perception.
c. peripheral vision.

d. depth perception.
e. selective attention.

4. The stage of sleep in which an EEG would detect the bursts of rhythmic activity known as sleep spindles is called

a. REM sleep.
b. NREM-1.
c. NREM-2.
d. NREM-3.
e. hypnagogic sleep.

5. Ulric’s doctor suggested that he consider moving to an area where there is greater sunlight or purchasing a light box that emits a bright light. Given these treatment options, Ulric’s doctor must have diagnosed Ulric with

a. attention-deficit/hyperactivity disorder.
b. a seasonal pattern for depressive disorders.
c. posttraumatic stress disorder.
d. antisocial personality disorder.
e. agoraphobia.

6. Damage to which of the following brain areas would create the most difficulty in interpreting feelings of heat and cold?

a. Motor cortex
b. Sensory cortex
c. Frontal lobe
d. Temporal lobe
e. Occipital lobe

7. A substance that interrupts neural transmission by fitting into a receptor site but not activating it, or by preventing another neurotransmitter from accessing the receptor site, is known as

a. an agonist.
b. an antagonist.

c. an endorphin.
d. a hormone.
e. the synaptic cleft.

8. Which of the following coefficients reflects the strongest correlation between two variables?

a. 0.42
b. –0.31
c. 0.74
d. –0.88
e. 0.86

9. After Donnie realized the “intruder” in his home was just his mother returning unexpectedly, his breathing began to slow down, his heart rate decreased, and his digestion began again. These changes were coordinated by the

a. limbic system.
b. parasympathetic nervous system.
c. sympathetic nervous system.
d. afferent neurons.
e. efferent neurons.

0. The oldest theory about human motivation, which focuses on unlearned, complex patterns of behavior present throughout a species, is known as

a. arousal theory.
b. drive-reduction theory.
c. instinct theory.
d. extrinsic motivation.
e. the hierarchy of needs.

1. Prefixes and suffixes are small groups of letters that when added to the beginning or ending of words alter the definition of those words. Prefixes and suffixes, then, are examples of

a. phonemes.
b. morphemes.
c. algorithms.
d. accommodation.
e. assimilation.

2. Which of the following most accurately describes a projective test?

a. A test designed to reveal a person's inner ability to do a task he or she has not tried before.
b. A test that shows a person's true preferences, based on responses to multiple-choice questions.
c. A test that indicates the level of indifference to pain that a person experiences.
d. A test created to see if one has an anxiety-inducing problem, but is instead claiming that others have that problem.
e. A test that prompts a person to reveal hidden conflicts by responding to ambiguous stimuli.

3. Mr. Winters is a trainer who encourages his clients to lose weight. Instead of simply rewarding them when their weight declines, he is rewarding them each time they behave in ways that would reduce weight—each time they exercise, decline high-calorie foods, or even take the stairs at work. Reinforcing each time one gets closer to a desired behavior is known as

a. conforming.
b. extinguishing.
c. social loafing.
d. shaping.
e. classical conditioning.

4. Often restaurants will require groups of eight or more to pay a tip of 18 percent. This is based on the belief that in larger parties, individuals will often leave a smaller tip because "someone else will pay more." These restaurant owners, then, are aware of the impact of

a. the fundamental attribution error.
b. the power of the situation.
c. hindsight bias.
d. confirmation bias.
e. diffusion of responsibility.

5. In a research study, Dr. Regalis has participants listen to different kinds of music while she uses a brain scan to examine their brain functioning. Dr. Regalis is most likely studying which part of the brain?

a. Temporal lobe
b. Occipital lobe
c. Broca’s area
d. Motor cortex
e. Corpus callosum

6. As a patient experiences an anxiety attack, he may experience a series of changes that are coordinated by the sympathetic nervous system. Which one of the following would the patient experience?

a. Decreased heart rate
b. Slower breathing
c. Decreased salivation
d. Constricted pupils
e. Increased rate of digestion

7. Joanna’s grandmother told her, “When we were little, we couldn’t afford new clothes, so our mother made us dresses out of potato sacks.” Joanna’s great-grandmother’s ability to envision how a potato sack could be used as material for a dress suggests that she was able to overcome

a. confirmation bias.
b. functional fixedness.
c. algorithms.
d. divergent thinking.
e. belief bias.

8. Research has found that individuals suffering from schizophrenia have an excess number of receptors for the neurotransmitter

a. acetylcholine.
b. norepinephrine.
c. GABA.
d. dopamine.
e. serotonin.

9. Modern psychodynamic counselors are likely to emphasize

a. the role of the id, ego, and superego.
b. the importance of early childhood experiences.
c. long, intensive therapy sessions over a period of many years.
d. fixations that may have stemmed from repressed sexual urges.
e. a patient’s responses to Rorschach inkblots.

0. Which of the following is an example of variable-ratio reinforcement?

a. College acceptance letters arrive around the date of April 1.
b. Percy gives his dog a cookie whenever his dog walks by strangers without barking.
c. Esmeralda disliked the substitute teacher, so she scowled every time she looked at him.
d. Judy discovered a shark’s tooth after several hours of searching for one on the beach.
e. When Stu had been working on his homework for one hour, his mother allowed him to go outside and play.

1. What perspective is sometimes referred to as the “third force,” since it offered a more optimistic alternative to Freud’s psychoanalysis and Skinner’s behaviorism?

a. Biological psychology
b. Humanistic psychology
c. Cognitive psychology
d. Evolutionary psychology
e. Social-cultural psychology

2. The type of therapy that is most likely to emphasize a social-cultural approach by focusing on the patient’s environment is

a. family therapy.
b. rational-emotive behavioral therapy.
c. cognitive therapy for depression.
d. psychopharmacological treatments.
e. aversive therapy.

3. Which part of the brain would be most involved in maintaining homeostasis in body temperature?

a. Prefrontal cortex
b. Temporal lobe
c. Thalamus
d. Hypothalamus
e. Amygdala

4. Unexplained physical symptoms, including headaches, pain, and digestive problems, which cannot be explained by physical or mental causes, may be diagnosed as

a. depressive disorders.
b. personality disorders.
c. somatoform disorders.
d. dissociative disorders.
e. eating disorders.

5. A psychologist who uses aversive conditioning to treat a child’s bed-wetting problem is using which of the following approaches?

a. Cognitive
b. Biological
c. Behavioral
d. Evolutionary
e. Social-cultural

6. Psychologist David Wechsler has created tests for adults and children that are designed to reveal their

a. intelligence.
b. aptitude.
c. achievement.
d. personality characteristics.
e. symptoms of psychological disorders.

7. In order to follow the ethical principles for research as established by the APA, psychologists should

a. recruit participants for experiments by placing ads in college newspapers.
b. publish the full results, including participant information, of their research online.
c. keep their operational definitions secret so that they cannot be copied by other researchers.
d. debrief the participants after the conclusion of the research.
e. allow minors to choose to be participants if they wish to.

8. Which of the following statements is most typical of the approach of a cognitive therapist?

a. "Let's go back to your statement about your happiness as a child."
b. "When you say 'No one likes me' that's illogical, because you do have close friends."
c. "What I hear you saying is you are angry, and I can hear the frustration in your voice."
d. "I'm going to start teaching you to relax, and then we'll slowly deal with your phobia."
e. "I think that prescribing you an SSRI will increase your positive mood over the next few weeks."

9. Dr. Alscott has examined two sets of data from his research. In the first set, the standard deviation was very small, while in the second set there was a much larger standard deviation. Based on this information, what conclusion can be drawn from these two sets?

a. The median was greater than the mean in the second set.
b. The mean was greater than the median in the second set.
c. The standard deviation in both sets revealed a positive correlation between the data.
d. Most data points were closer to the mean in the first set than in the second.
e. Most data points were closer to the mean in the second set than in the first.

0. “The curious paradox is that when I accept myself just as I am, then I can change.” This core idea in humanistic psychology is a quotation from

a. Sigmund Freud.
b. Carl Rogers.
c. Aaron Beck.
d. Carl Jung.
e. B. F. Skinner.

1. Hans Selye argued that our bodies produce a similar reaction to all kinds of stress, and the longer this response continues, the more exhausted we become. He named this process

a. the opponent-process theory.
b. systematic desensitization.
c. the general adaptation syndrome.
d. the global assessment of functioning.
e. triarchic intelligence.

2. “Both the left and the right hemisphere may be conscious simultaneously in different, even in mutually conflicting, mental experiences that run along in parallel.” This quotation by neuropsychologist Roger Sperry refers to his Nobel Prize–winning research on the effects of severing which part of the brain?

a. Amygdala
b. Brainstem

c. Corpus callosum
d. Thalamus
e. Pituitary gland

3. Martin Seligman developed the concept of learned helplessness, the tendency of organisms to give up in situations in which they feel their efforts make no difference. This concept is closely linked to which of the following psychological disorders?

a. Agoraphobia
b. Schizophrenia
c. Major depressive disorder
d. Generalized anxiety disorder
e. Narcissistic personality disorder

4. John Watson's development of the concept of behaviorism was influenced most strongly by the work of

a. Wilhelm Wundt.
b. the Gestalt psychologists.
c. John Locke.
d. B. F. Skinner.
e. Ivan Pavlov.

5. Psychologists Walk and Gibson attempted to determine whether infants had developed the ability to perceive depth by

a. having them crawl over what appeared to be a sharp ledge.
b. measuring how long they looked at novel stimuli.
c. throwing soft foam balls to them and seeing how they would react.
d. showing them a simulation of birds flying at their faces.
e. seeing if they reached for a toy when it was held slightly beyond the reach of their arms.

6. Systematic desensitization would most likely be used as a treatment for which of the following disorders?

a. Arachnophobia

b. Schizophrenia
c. Bipolar disorder
d. Hypochondriasis
e. Tardive dyskinesia

7. A manager at an ice cream store wants to increase sales, so he creates a program to rank his employees' sales. His goal is to give a cash prize each week to the employee who has sold the highest number of ice cream cones. His strategy is based on the idea of

a. the life story approach.
b. intrinsic motivation.
c. extrinsic motivation.
d. the collective unconscious.
e. self-efficacy.

8. The fire alarm has gone off so many times in their new school that Susannah and Tia don't even flinch anymore when they hear it. They even remained in the school library during a fire drill because they assumed it was another malfunction. Their failure to respond like they once did to the fire alarm shows the process of

a. acquisition.
b. discrimination.
c. accommodation.
d. extinction.
e. assimilation.

9. Dr. Anders wants to investigate how people of different ages communicate via the Internet, so she does an experiment with three groups of three different ages: 18- to 21-year-olds, 47- to 50-year-olds, and 75- to 78-year-olds. Concurrently comparing how people of different ages behave is an example of which of the following kinds of research?

a. Case study
b. Longitudinal

c. Cross-sectional
d. Factor analysis
e. Qualitative

0. In studies, reminding female test-takers that women historically have done poorly on a similar test can lead to lower test performance—particularly when compared with the scores of women who weren’t given such information. This decline in performance is an example of

a. stereotype threat.
b. hindsight bias.
c. the mere exposure effect.
d. social facilitation.
e. negative transference.

1. Research suggests that there is a connection between parenting style and social skills. Children with lower scores on measures of social skills and self-esteem tend to have parents who are

a. authoritative.
b. permissive.
c. authoritarian.
d. neglecting.
e. demonstrative.

2. Dr. Pilai worked with the government to create new standards for people seeking jobs as airport security screeners. She included assessments in the interview process, designs for the flow of the security process itself, and measures for evaluating the job performance of these screeners. Which psychology career category best fits Dr. Pilai’s work?

a. Developmental
b. Clinical
c. Forensic
d. Industrial-organizational
e. Community

3. Which emotion theory places the greatest emphasis on physiological changes happening first, which are then followed by an experience of an emotion?

a. Schachter-Singer theory
b. James-Lange theory
c. Cannon-Bard theory
d. Arousal theory
e. Incentive theory

4. Although the group of senior citizens beat the teenagers in a trivia contest based on history, they were not nearly as successful in a competition that required them to quickly learn the rules of a new video game. This is most likely due to the decline of which of the following as humans age?

a. Learned helplessness
b. Cognitive dissonance
c. Fluid intelligence
d. Crystallized intelligence
e. Elaborative rehearsal

5. Which of these statements is most accurate about REM sleep?

a. These periods are the longest at the beginning of the sleep period, then get shorter through the night.
b. These periods are the shortest at the beginning of the sleep period, then get longer through the night.
c. During these periods, brain activity is as reduced as muscle activity.
d. The brainstem continues to pass on motor activity signals to the rest of the body during REM sleep.
e. The dreams during this stage are frequently interrupted by sleep spindles.

6. Random-dot stereograms are pictures that have an image hidden among the dots. Humans can often see these hidden images because each eye has a slightly different image projected on its retina, allowing us to see depth. Which term best describes this process?

a. Motion parallax
b. Convergence
c. Retinal disparity
d. Relative height
e. Linear perspective

7. A therapist tells a CEO that the reason he yells and screams at his staff is due to behavior he learned as a child. When he was a child, he threw temper tantrums in order to get his way. What is the term for this defense mechanism?

a. Regression
b. Reaction formation
c. Projection
d. Rationalization
e. Sublimation

8. During a dental procedure, Xavier is injected with a drug that is designed to greatly reduce his pain by interfering with the sending of pain signals. At the neural level, the drug is preventing

a. action potentials from being transmitted.
b. neurotransmitters from being reabsorbed by neurons.
c. potassium ions from being released at the terminal buttons.
d. pain signals from being clearly interpreted in the sensory cortex.
e. the myelin sheath from protecting the axon.

9. A babysitter cuts a sandwich into three equal pieces, then keeps two and gives one to the child she is caring for. The child is upset that this is unfair, so the babysitter divides the child’s piece into two. Since each of them now has two pieces, the child is content. According to Jean Piaget, this is because the child lacks

a. accommodation.
b. assimilation.
c. formal operational knowledge.

d. sensorimotor ability.
e. conservation.

0. A young gymnast works out many hours each day to prepare for a national competition. This schedule means that she has to forgo opportunities to socialize with her peers, and makes it hard to have a romantic relationship. The gymnast’s willingness to give up some things that would make her feel less lonely and separated in order to pursue athletic achievements is at odds with whose theory of human motivation?

a. Abraham Maslow
b. Henry Murray
c. Philip Zimbardo
d. David McClelland
e. Solomon Asch

1. Seven-year-old Daniel was able to see that the dot-to-dot puzzle was going to form a picture of a tiger even before he started drawing on the puzzle. Which Gestalt principle helped Daniel perceive the tiger from all the unconnected dots?

a. Proximity
b. Continuity
c. Bipolar cues
d. Retinal disparity
e. Closure

2. In an experiment by Stanley Schachter and Jerome Singer, participants labeled their arousal as joyous or irritable, depending on the people they were with. This experiment established that emotions are not only physiological but are also

a. psychodynamic.
b. humanistic.
c. biological.
d. cognitive.

e. behavioral.

3. A tumor cut off bloodflow to a small section of Gia’s brain, and as a result she struggled to understand the words that were being spoken to her. The damage to Gia’s brain was probably localized in her

a. Wernicke’s area.
b. Broca’s area.
c. hippocampus.
d. hypothalamus.
e. brainstem.

4. According to the behavioral perspective, the purpose of punishment is to

a. make a person sorry for the behavior he has committed.
b. associate a positive consequence with a negative consequence.
c. make a behavior less likely to happen again.
d. allow the behavior to only occur again during a spontaneous recovery.
e. extinguish the response permanently.

5. When Eli initially joined an online group that was working against increased government spending, he only had mild views on the topic. If he continues in the group and rarely gets information from alternate sources with opposing views, what might be the outcome?

a. He might become deindividuated and express views against the group’s beliefs.
b. He might use social facilitation to spread the group’s views more widely online.
c. He might use confirmation bias to seek out sources that challenge his beliefs.
d. His views and the group members’ views might become more similar and more intensely felt over time.
e. His views and the group members’ views might become more varied and less intensely felt over time.

6. When seeking to hire a new creative director for an advertising agency, Amina decided that she wanted to find a person who could devise numerous ways to solve problems. A person talented in this area would most likely be good at

a. divergent thinking.
b. convergent thinking.
c. belief perseverance.
d. solving crossword puzzles.
e. doing arithmetic.

7. The personality test that is based on the writings of Carl Jung is the

a. Minnesota Multiphasic Personality Inventory.
b. Wechsler Adult Intelligence Scale.
c. Rorschach inkblot test.
d. Thematic Apperception Test.
e. Myers-Briggs Type Indicator.

8. Jason was watching the TV news, which showed footage of a young man running away from the police. "He's running away, so he must be a bad man," said Jason to his father. Jason's statement is an example of

a. the availability heuristic.
b. the representativeness heuristic.
c. stereotype threat.
d. the fundamental attribution error.
e. cognitive dissonance.

9. The sound of a sizzling steak or the smell of a warm apple pie might make people want to eat those items. In the study of motivation, the sound and smell are considered to be

a. incentives.
b. arousal-inducing.
c. drives.
d. self-actualization needs.
e. fixed action patterns.

0. In the early twentieth century, French psychologists led by Alfred Binet developed the first test for intelligence to be given to French school children for the purpose of

a. selecting the most capable to be trained as future leaders.
b. identifying those who might be wasting their talents and not taking school seriously.
c. testing whether French teachers merited higher pay.
d. evaluating the quality of French schools.
e. finding children who were struggling academically.

1. “We were not surprised to discover that contact comfort was an important basic affectional or love variable, but we did not expect it to overshadow so completely the variable of nursing . . .” This quotation was written by which of the following psychologists?

a. Harry Harlow
b. Konrad Lorenz
c. B. F. Skinner
d. John B. Watson
e. Mary Ainsworth

2. A researcher finds a difference between an experimental group and a control group that is less likely due to chance and more likely due to the manipulation of the independent variable. This finding then is most likely to be

a. a replication.
b. statistically significant.
c. below the margin of error.
d. reliable, but not valid.
e. valid, but not reliable.

3. The mere exposure effect helps explain why the most important predictor of whether two people become friends is

a. similarity of religious and political views.
b. similar interests in the arts and culture.

c. their physical attractiveness.
d. their social status and level of income.
e. their proximity to each other.

4. Albert Bandura believed that children could learn not only by doing behaviors themselves, but also by watching models perform those behaviors. Bandura's work expanded the idea of learning to include

a. observational learning.
b. classical conditioning.
c. operant conditioning.
d. latent learning.
e. rote learning.

5. Which of the following is an example of a self-fulfilling prophecy?

a. David has had trouble in math in the past, so in his new math class he gives up on the first day.
b. Ivy does not think her teacher has treated her fairly, so she complains to her principal.
c. Samuel's teacher puts him in a group with struggling students, and Samuel, normally a good student, responds by doing very poor work. The next week he is placed in the same group.
d. Rachel writes a letter to the editor about her concerns with the city council, and as a result her social studies teacher praises her in class.
e. Nyah's father takes her out of an advanced class because she is struggling at first, but she responds by working even harder and making better grades in all of her classes.

6. Noam Chomsky's beliefs about language are based on the idea that

a. language is only possible during a critical period, and not afterward.
b. simple mastery of phonemes and morphemes does not represent a true language.
c. the rules of syntax are more important than semantics in understanding language.
d. language is innate and we all share a universal grammar.

e. language is just as possible in animals as in humans, given enough time and training.

7. Paul was unable to correctly identify the right shade of blue his wife wanted at the paint store, so he purchased various hues and brought them home. The distinctions among the similar shades of blue apparently fell below Paul's

a. signal detection.
b. absolute threshold.
c. difference threshold.
d. excitatory level.
e. inhibitory level.

8. Teachers at York High School were dismayed at a new test they would be required to take to demonstrate their ability as educators. Rather than a test of content knowledge or of teaching techniques, the new test would measure their reaction time to a series of rapidly flashed abstract images—not a skill they normally need in the classroom. Despite the assurances of the test's creator, the teachers argued that a test like this would have low

a. content validity.
b. predictive reliability.
c. split-half reliability.
d. test-retest reliability.
e. psychometric ratings.

9. In Stanley Milgram's experiments on obedience, he discovered that participants were less obedient when

a. the person giving the orders was close at hand and was perceived to be a legitimate authority figure.
b. the authority figure was supported by a prestigious institution.
c. the victim was depersonalized or at a distance.
d. Milgram dissociated his experiments from Yale University.
e. there were no role models for defiance.

0. The work of Elizabeth Loftus and other researchers has led to significant changes in the way courts and police officers think about

a. the traumatic effects of solitary confinement.
b. whether people with schizophrenia can be forced to take medication against their will.
c. whether the insanity defense is legitimate for legally insane individuals.
d. whether people should be forced to testify against their spouse on the witness stand.
e. the accuracy of eyewitness testimony.

1. The developmental theories of Lev Vygotsky differed from those of Jean Piaget in that Vygotsky

a. emphasized the role of the social environment.
b. thought that Piaget ignored the psychosexual development of children.
c. questioned Piaget's focus on adult development.
d. focused more on moral development.
e. thought that the spiritual component of children's growth was essential.

2. Dorothea Dix was a passionate advocate for

a. reform in the treatment of the mentally ill.
b. the elimination of culturally-biased IQ tests.
c. identifying and reducing the self-fulfilling prophecy in schools.
d. changing the way disorders are classified in the DSM-5.
e. creating an alternative to the use of psychopharmacological medication.

3. For those who focus on the biological approach, important evidence for whether someone who has been diagnosed with depression is improving is

a. the quality of their statements about their own abilities and attitudes.
b. whether the number of contacts with their friends and families has

increased.

c. whether they have begun to establish and work toward long-term goals.
d. whether the serotonin levels in their blood have increased.
e. if they have no suicidal thoughts or intentions.

4. Instead of methodically poring through the atlas to find the correct map, Ivan just flipped to the section of the book where he thought it might be. Using a strategy based on a hunch rather than examining each page carefully involves the use of

a. an algorithm.
b. a heuristic.
c. an “Aha!” moment.
d. insight.
e. framing.

5. On the very first day of class, Mr. Boyarsky gave his students a test. When some complained, he responded that he wanted to know what their talents were, so he was giving them a test to predict what kind of skills they might learn best, and what kinds of jobs they might like to do one day. Mr. Boyarsky’s test was

a. an aptitude test.
b. an intelligence test.
c. an achievement test.
d. a personality test.
e. a projective test.

6. When basketball star Michael Jordan graduated from college as one of a small number of geography majors, the average starting salary for a geography major soared by several hundred thousand dollars. In a situation like this, where one unusual bit of data greatly inflates the average, it is important to use which measure of variation?

a. Mean
b. Median

c. Range
d. Standard deviation
e. Mode

7. Damage to what part of a neuron might result in slowed or incomplete neural transmission along the axon?

a. Cell body
b. Mitochondria
c. Dendrite
d. Myelin sheath
e. Synapse

8. Dr. Warren is testing to see if there is a relationship between the consumption of caffeine and memory. She randomly divides 300 participants into three groups and gives each participant an energy drink to consume. Some of the drinks have high levels of caffeine, some have medium levels, and some have none at all—but they all taste the same. About 30 minutes later, she has the participants play a memory game on the computer where they have to match faces and names together. At the end of the game, the computer thanks them for playing, and their scores are sent to Dr. Warren's lab. The dependent variable in the experiment is

a. how quickly the participants matched the names and faces.
b. the participants' scores from the memory game.
c. the amount of caffeine they consumed.
d. their explanations about how they played the game.
e. the amount of caffeine they consume in a typical week.

9. The independent variable in the experiment described in question 98 is

a. how quickly the participants matched the names and faces.
b. the participants' scores from the memory game.
c. the amount of caffeine they consumed.
d. their explanations about how they played the game.
e. the amount of caffeine they consume in a typical week.

0. A person who has an external locus of control is most likely to explain success or failure on a math test as due to

a. how difficult the questions were.
b. whether he had effectively studied enough.
c. whether he had been able to understand the course material.
d. how well prepared he had been prior to taking the course.
e. the amount of time he had set aside to study.

Free-Response Questions

1. Psychology professors Elliott and Elizabeth are co-writing a book about what kinds of behaviors lead to feelings of happiness.

A. Explain the type of research studies Elliott and Elizabeth should look for as they investigate behaviors that cause feelings of happiness. Use the following terms in your explanation. Note: Definitions alone will not score.

- Experimental method
- Correlational method
- Operational definition

B. Discuss what Elliott and Elizabeth are likely to learn as they read about studies of the relationship between the following psychological factors and happiness.

- REM sleep
- Serotonin
- Facial feedback effect

2. Charlie has been teaching for 25 years and was just assigned a student teacher, Randy. Charlie wants to advise Randy about effective teaching methods.

A. What advice should Charlie give Randy about the effectiveness of the following kinds of techniques and whether they might help motivate students in their classroom?

- Classical conditioning

- Positive reinforcement
- Positive punishment

B. Randy is interested in teaching students study skills that will help them learn and retain information. Discuss how the following concepts might help or get in the way of effective studying.

- Semantic encoding
- State-dependent memory
- Serial position effect

C. Finally, Charlie wants to advise Randy about how to develop a healthy classroom atmosphere. How could Charlie use the following concepts in his advice about building a supportive classroom culture?

- Ingroup bias
- Superordinate goals

Appendix B: AP® Exam Tips

Unit 1

Module 1

Page 2: To assist your active learning of psychology, Learning Targets are grouped together at the start of each module and then framed as questions that appear at the beginning of the pertinent section of reading. It helps to keep the question in mind as you read through a section to make sure that you are following the main point of the discussion.

Page 6: Memory research reveals a *testing effect*: We retain information much better if we actively retrieve it by self-testing and rehearsing. (More on this in Module 2.) To bolster your learning and memory, take advantage of the self-testing opportunities you will find throughout this text. These Check Your Understanding sections will appear periodically throughout each module. The *Ask Yourself* questions will help you relate the material to your life (making it more memorable). You can check your answers to the *Test Yourself* review questions in Appendix E. (In the e-Book, answers are a click away.)

Page 7: Every question on the AP® psychology exam will reflect the fact that psychology is a science built on the tradition of Wundt and his laboratory. Correct test answers are based on what research has revealed, not on “common sense”!

Page 10: There are lots of important people in psychology. As you study, focus on the significance of their accomplishments. You are more likely to be tested on what a finding means than who discovered it.

Page 12: FRQ stands for “Free-Response Question.” The AP® exam contains two of these essay-style questions, which count for one-third of your final score. The actual FRQs will be complex, requiring you to integrate knowledge from across multiple modules, like the practice questions you will find at the end of each unit in this text. These simpler “Practice FRQs” that appear at the end of each module, along with a sample grading rubric, will help you get started practicing this skill.

Module 2

Page 14: Pay close attention to what your authors, David Myers and Nathan DeWall, are emphasizing as they tell the story of psychology. When they say the nature–nurture issue is the *biggest* issue in psychology, that’s a sign that it’s likely to be covered on the AP® exam.

Page 17: You will see versions of Figure 2.1 throughout the text. Spend some time right now familiarizing yourself with how the figure’s three viewpoints might contribute to behavior or mental processes, the very stuff of psychology.

Page 17: These perspectives will come up again and again throughout your AP® psychology course, and they likely *will* be on the exam. You need to become very comfortable with the meaning of terms such as *behavioral*, *cognitive*, and *psychodynamic.* Ask your teacher for clarification if you are the least bit unclear about what the perspectives mean.

Module 3

Page 25: Take careful note of the fact that psychiatry is a medical specialty. You should be able to summarize the similarities and differences among counseling psychologists, clinical psychologists, and psychiatrists for the AP® exam.

Page 26: You are about to read about a lot of career possibilities in psychology. Note the division between basic subfields and applied subfields. The work of some of these specialties is pretty obvious (it’s not that hard to figure out in general what an *educational psychologist* or a *health psychologist* might do). Questions about psychology’s specialties have previously been on the AP® exam. Devote extra attention to those specialties that may be unfamiliar to you.

Unit 2

Module 4

Page 40: Multiple-choice questions on the AP® exam sometimes test your knowledge of “media myths.” Pay particular attention when psychological findings run counter to “common sense.”

Module 5

Page 42: As you read this module, keep in mind that the scientific method is a set of principles and procedures, not a list of facts. You will be expected to understand how the science of psychology is done, not just what it has discovered. The AP® exam frequently asks questions regarding research design in the multiple-choice and free-response sections.

Module 6

Page 51: This is the first of *several* times in your psychology course that you will see something labeled as being positive or negative. We often think that if something is positive it is good and if it’s negative it’s bad. That is rarely the case in this course. Here, positive and negative refer only to the direction of the correlation. They say nothing about whether the relationship is desirable or not.

Page 52: Take note of how much emphasis is put on this idea; correlation and association do not prove a cause-effect relationship. This has been on the AP® exam in the past.

Page 56: The identification of independent and dependent variables is the single most likely concept to be tested on the AP® exam. Experiments are critical to psychology, and independent and dependent variables are critical to experiments.

Module 7

Page 60: Table 7.1 summarizes 13 pages of coverage. Spend some time with it, as it is information you will likely encounter on the AP® exam.

Module 8

Page 71: Sometimes a phrase that is frequently used in the media has a more specific meaning when used in psychology. That’s the case with the phrase “statistically significant.” Make sure you know the precise meaning of this. It has been on the AP® exam in the past.

Unit 3

Module 9

Page 80: There is a ton of vocabulary in this unit and in psychology. However, learning vocabulary is really not so hard: The secret is to work on it every day. Try flash cards. Work with a study buddy. Impress your non-psych friends with your new vocabulary. Just don’t leave it until the night before the test. If you rehearse the vocabulary throughout the unit, you will do better on the unit test. Don’t just reread the flash cards, but rather quiz yourself on them or paraphrase them in your own words. The big bonus is that you will also retain far more information for the AP® exam.

Page 85: Note the important shift here. So far, you have been learning about how just one neuron operates. The action potential is the mechanism for communication *within* a single neuron. Now you are moving on to a discussion of two neurons and how communication occurs *between* them—very different, but equally important. Both ideas are important for the AP® exam.

Page 87: As the text indicates, there are dozens of different neurotransmitters. Though there’s no way to predict exactly which ones you’ll see on the AP® exam, it’s quite possible you will be asked about the neurotransmitters in Table 9.1.

Page 88: Be very clear on this. Neurotransmitters are produced inside the body. They can excite and inhibit neural communication. Drugs and other chemicals come from outside the body. They can have an agonistic effect or an antagonistic effect on neurotransmission. Students have confused these concepts on the AP® exam.

Module 11

Page 101: Your authors, David Myers and Nathan DeWall, are about to take you on a journey through your brain. Focus on the name of each part, its location within the brain, and what it does. Then it’s time to practice, practice, practice. The brain structures have been on previous AP® exams.

Module 13

Page 121: The classic split-brain studies are likely to show up on the AP® exam.

Page 123: Notice that David Myers and Nathan DeWall never refer to your left brain or your right brain. You have two brain hemispheres, each with its own responsibilities, *but you only have one brain*. It’s very misleading when the media refers to the left brain and the right brain, and this happens frequently. When studying for the AP® exam, try to stay away from psychology myths.

Page 125: Dual processing is another one of those big ideas that shows up in several units. Pay attention for the AP® exam!

Module 14

Page 136: Heritability is an important but challenging concept. The key thing to remember is that heritability refers to variation within a group. It does not refer to the impact of nature on an individual. Be clear on both what it is and what it isn't.

Unit 4

Module 16

Page 159: You may wish to think about how the information on selective attention relates to something a little less dangerous: studying. The same principles apply. The more time you spend texting, tweeting, and social networking, the less focused you'll be on the material you're trying to master. A better strategy is to spend 25 minutes doing schoolwork and schoolwork alone. Then you can reward yourself with a few minutes of online time.

Module 18

Page 178: There's a lot of vocabulary here. Make sure you understand the name and the function of each part of the eye. To learn how all the parts fit together, it may help to make rough sketches (you don't need to be an artist to try this!) and then compare your sketches with Figures 18.3 and 18.4. You'll be better off making several quick, rough sketches than one time-consuming, nicely drawn one.

Module 19

Page 188: The Necker cube is an excellent vehicle for understanding the distinction between sensation and perception. Students often get these terms confused. The only visual stimuli are the blue wedges. The circles, lines, and cube are all the products of perception—they are in your mind and not on the page.

Page 191: The illustrations in Figure 19.6 provide you with excellent opportunities to practice identifying monocular depth cues. To really demonstrate your understanding, look for these cues in other drawings and photographs. There are almost always cues to identify. This practice will help you master the terms for the AP® exam.

Module 20

Page 198: Pay attention to how many pages are devoted to each of the senses. Not only does this represent the complexity of the sensory system, it also represents how likely you are to find questions about that system on the AP® exam. Given that more pages are devoted to vision than hearing, there are likely to be more exam questions on vision.

Page 199: Note that both light and sound travel in waves. In each case, understanding the meaning of varying amplitude and length of the waves is important for the AP® exam.

Unit 5

Module 22

Page 224: Note that our modern-day understanding of the unconscious is very different from Sigmund Freud’s theory of the unconscious (Module 55). Freud believed the unconscious was a hiding place for our most anxiety-provoking ideas and emotions, and that uncovering those hidden thoughts could lead to healing. Now, most psychologists simply view the unconscious track as one that operates without awareness. Make sure you keep these two ideas of the unconscious straight. Both interpretations could be seen on the AP® exam.

Page 225: Psychological research corrects the mistaken popular belief that hypnosis or other methods can be used to tap into a pure and complete memory bank. You will learn much more about how memory really works when you get to Unit VII. The topic of hypnosis has been on the AP® exam, so become knowledgeable about it.

Module 23

Page 234: Study this cycle of sleep carefully. One common mistake that students make is to believe that REM sleep comes directly after deep NREM-3 sleep. As you can see, it does not. Generally, NREM-2 follows NREM-3. Then comes REM. This clarification will help for the AP® exam.

Module 24

Page 242: Make sure you get a good night's sleep before the AP® exam!

Page 246: The AP® exam could have you identify and differentiate the sleep disorders. For example, you might be asked to explain the difference between a night terror and a nightmare.

Module 25

Page 255: These three categories—depressants, stimulants, and hallucinogens—are important. There are likely to be questions on the AP® exam that will require you to know how a particular psychoactive drug is classified and what affect the drug has on the body.

Page 260: Figure 25.3 is an excellent review of how neurotransmitters work. If there is any part of this that you don't understand, head back to Module 9 for a complete explanation. Neural communication is a topic that has been on the AP® exam.

Unit 6

Module 26

Page 271: The AP® exam could have you differentiate similar concepts from various units. For example, it's easy to confuse *habituation* with *sensory adaptation*, a concept from Unit IV. Recall that sensory adaptation occurs when one of your sensory systems stops registering the presence of an unchanging stimulus—when you go swimming in a cool pool, for example, the water soon stops feeling cool. Habituation, like sensory adaptation, involves a diminished response, but in this case it's a form of learning. If you're exposed to the same stimulus over and over, your response decreases. A friend might sneak up and startle you by yelling "Boo!" You will probably startle less when he tries it again two minutes later. That's habituation.

Page 275: You may find it helpful to note that spontaneous recovery is, in fact, spontaneous (Figure 26.6). Notice that the extinguished conditioned response returns without any additional pairing with the unconditioned stimulus. It is not a form of acquisition.

Page 277: Generalization and discrimination are introduced in this module, but they don't just apply to classical conditioning. These two concepts will show up in other types of learning as well. It is important that you understand this for the AP® exam.

Module 27

Page 286: Prepare to identify specific examples of positive and negative reinforcements. Pay particular attention to Table 27.1 for guidance.

Page 288: Students sometimes have difficulty with the schedules of reinforcement. The word *interval* in schedules of reinforcement means that an interval of time must pass before reinforcement. There is nothing the learner can do to shorten the interval. The word *ratio* refers to the ratio of responses to reinforcements. If the learner responds with greater frequency, there will be more reinforcements.

Page 289: You must be able to differentiate between reinforcement and punishment. Remember that *any kind of reinforcement* (positive, negative, primary, conditioned, immediate, delayed, continuous, or partial) encourages the behavior. *Any kind of punishment* discourages the behavior. Positive and negative do not refer to values—it's not that positive reinforcement (or punishment) is the good kind and negative is the bad. Think of positive and negative mathematically; a stimulus is added with positive reinforcement (or punishment) and a stimulus is subtracted with negative reinforcement (or punishment).

Module 28

Page 297: You may have to differentiate classical conditioning and operant conditioning on the AP® exam. Classical conditioning is involuntary (respondent) behavior, while operant conditioning is voluntary (operant) behavior.

Module 29

Page 301: In the middle of the twentieth century, behaviorism was the dominant perspective in psychology, with little attention paid to the influence of biology and cognition in learning. Now we know better. As you read through this module, notice how important biological and cognitive factors are for understanding learning. This module reflects the biological and cognitive perspectives of psychology learned about in Unit I. The psychological perspectives (approaches) are frequently seen on the AP® exam (refer to Table 2.1, page 18)

Unit 7

Module 31

Page 327: The next three modules deal with memory. Not only is this a significant topic on the AP® exam, but it is also, for students, one of psychology's most practical topics! As you read, think about how you can apply what you're learning about encoding, storing, and retrieving information—and become a better student.

Page 330: You will see several versions of Figure 31.3 as you work your way through Modules 31, 32, and 33. Pay attention! This model may look confusing now, but it will make more and more sense as its components are described in detail. The three stages of memory and the encoding process will be important to know for the AP® exam.

Page 335: It's not the studying you do in May that will determine your success on the AP® exam; it's the studying you do now. It's a good idea to take a little time each week to quickly review material from earlier in the course. When was the last time you looked at information from the previous units?

Page 336: Are you often pressed for time? The most effective way to cut down on the amount of time you need to spend studying is to increase the personal meaningfulness of the material you're trying to remember. If you can relate the material to your own life—and that's pretty easy when you're studying psychology—it takes less time to master it.

Module 32

Page 344: Figure 32.4 is an excellent summary. Why don't you review it for a few minutes and then see how much of it you can reproduce on a piece of paper? That will give you a good assessment of which parts of the memory process you know and which parts you still need to work on.

Module 33

Page 354: Students frequently get proactive and retroactive interference confused on the AP® exam. Can you differentiate these terms by definition and example?

Module 35

Page 373: Make sure you understand the difference between representativeness and availability heuristics. AP® exam takers have confused them.

Page 376: We're all human—and vulnerable to confirmation bias, overconfidence, and belief perseverance. Can you distinguish these?

Module 36

Page 382: It is sometimes challenging to keep these building blocks straight. Phonemes are sounds. It may help to remember that phones carry sounds. Morphemes have meaning, and both words begin with the letter *m*.

Page 388: You'll notice that even though the brain was one of the major topics in Unit III, it keeps coming up. It's a good idea to go back and review what you learned previously about the brain. Rehearse frequently, and you will not have much to relearn before the AP® exam.

Unit 8

Module 37

Page 403: Read carefully! Homeostasis is *not* a motivation theory, but rather a biological principle that applies to some motivational theories (such as drive-reduction theory). Make sure you can compare and contrast the motivational theories.

Module 39

Page 419: The central principle here is that there are many biological processes that govern human behavior less rigidly than they govern the behaviors of other species. Because of our highly developed brain, sex hormones have less control over our behavior than they do over other animals' behavior.

Module 40

Page 426: Free-response questions on the AP® exam often ask students to apply psychological principles to real-life situations. It's easy to imagine a question that deals with social media.

Module 41

Page 434: Be prepared for at least a multiple-choice question that tests your ability to compare and contrast the James-Lange, Cannon-Bard, and Schachter-Singer Two-Factor theories of emotion.

Page 436: Table 41.1 summarizes of the theories of emotion. They are presented in the order of appearance historically. Notice that cognition, an important factor in the modern theories, is not mentioned in the first two theories.

Page 438: Figure 41.4 compares and contrasts the sympathetic and parasympathetic nervous systems. On the AP® exam you may need to be able to identify which physiological effects occur with each division.

Module 43

Page 454: Be able to differentiate Walter Cannon's fight-or-flight theory and Hans Selye's general adaptation syndrome. These have been on the AP® exam in the past.

Page 460: It’s important to remember the difference between a longitudinal and cross-sectional studies.

Unit 9

Module 45

Page 486: All three of these issues are important for development. Nature and nurture, of course, weave their way through almost every module. Look for the nature–nurture idea throughout this text (and on the AP® exam).

Page 488: Almost every topic in psychology holds personal relevance, but development stands out. As you work your way through this unit, think of how the material relates to you, your relatives, and your friends. The more often you do this, the easier it will be to remember the material.

Module 46

Page 494: Note that maturation, to developmental psychologists, is a biological sequence. This is much more precise than the general notion that maturation means to become more adult-like.

Module 47

Page 499: Be able to identify what it means to assimilate and accommodate schemas. Students have confused these terms on the AP® exam in the past.

Page 501: Careful! *Egocentric* is not the same as egotistical. Egocentric means you can’t take someone else’s point of view. Egotistical means you’re pretty full of yourself.

Page 503: One good way to master the developmental milestones in Piaget’s theory is to see them in action. If you know children of various ages, you can test them using some of the ideas presented in this section. Hide a toy from an infant to see object permanence in action. Pour water between two differently shaped glasses to see if a preschooler understands conservation.

Page 504: Jean Piaget’s developmental stages are likely the topic of at least one AP® exam question. It may help to remember that for Piaget, children are little scientists, and for Vygotsky children are little apprentices.

Module 48

Page 511: Note that temperament is a contribution from the nature side of the nature–nurture debate.

Page 516: It’s understandable if you are struggling to remember the differences between authoritarian and authoritative. Maybe it will help to realize that authoritative parents will engage in a little more give and take, while authoritarian parents do not negotiate. The words *give* and *authoritative* both end in the letters *ive.*

Module 49

Page 521: There is a lot of information in this section. One good way to process these differences and similarities between genders is to consider which facts fit prevailing stereotypes and which don’t.

Module 51

Page 536: Kohlberg’s is an important stage theory. It’s very important to understand that the stage you’re in doesn’t depend on *what* you decide to do (for example, steal the medicine), it depends on *why* you decide to do it.

Module 52

Page 539: Become familiar with Table 52.1, Erikson’s Stages of Psychosocial Development, and be able to identify an individual that may be dealing with the issue in each stage. For example, a teenager may be dealing with the identity versus role confusion issue.

Module 54

Page 561: This section is a good example of the complexity of seemingly simple questions. It seems like one should be able to answer a question like “Does memory decline with age?” with a straightforward *Yes* or *No*. People are complex. Development is complex. We should not be surprised to learn that many factors influence memory in adulthood.

Unit 10

Module 55

Page 579: Be careful: It’s easy to confuse Freud’s three layers of the mind (conscious, preconscious, and unconscious) with the three parts of personality (the impulsive id, conscious ego, and restraining superego).

Page 582: The differences between these defense mechanisms aren’t always clear. For example, *repression* can be found in most examples. Focus on each example’s key feature. If the key feature is seeing your own impulse in someone else, it’s projection. If the key feature is shifting your aggression from one target to another, it’s displacement.

Page 587: It’s very important to understand the differences between Freud’s view of the unconscious and modern psychology’s view of the unconscious. Read this section carefully.

Module 57

Page 597: You are not likely to be asked questions about the specific traits in Figure 57.1. Focus instead on the two main dimensions (extraversion–introversion and stability–instability), and use the traits to get a sense of what the main dimensions mean.

Page 599: Table 57.1 is an excellent summary of the Big Five personality factors and what they mean. Be able to apply the traits to describe behavior. For example, you should be able to explain how high levels of agreeableness might help someone with a particular task.

Module 58

Page 608: Tables 58.1 and 58.2 summarize a whole unit’s worth of information. Review research methods and study the tables well to be clear on the distinctions separating the major approaches to personality.

Module 59

Page 612: Note the difference between *self-esteem* and *self-efficacy*. Although your feeling of self-worth might be related to your beliefs about how competent you are, they are not the same thing.

Unit 11

Module 60

Page 626: Your authors identified three “huge controversies” in the unit opener. All three are covered extensively in this book; be sure you can explain each of them.

Page 630: Familiarize yourself with Table 60.1. Be able to compare and contrast the contributions of the intelligence theorists (e.g., Spearman, Gardner, Sternberg).

Module 61

Page 633: Become familiar with the key contributors in intelligence testing and be able to identify how they differ (e.g., Galton, Binet, Terman).

Page 636: Can you remember why the intelligence test scores in Figure 61.2 are marked off in 15-point intervals? Do the 68 percent and 95 percent areas seem familiar? They should—you’ve seen this graph before. It’s Figure 8.3 from the module on statistical reasoning. Intelligence tests are being used to illustrate that 68 percent of a population will be within one standard deviation of the mean for normally distributed data. Ninety-five percent will be within two standard deviations.

Page 637: Be prepared for a question about the distinction between *reliability* and *validity*, and how psychologists assess each.

Module 62

Page 642: Students tend to confuse crystallized and fluid intelligence. Be able to identify examples of each and whether they generally increase or decrease with age. It might help you to think about how crystals grow larger over time, as does our knowledge (crystallized intelligence).

Module 63

Page 648: Figure 63.1 is worth spending some time on. Try grabbing a study buddy and explaining whether each of the five conditions provides more support for nature or more for nurture. In most cases, it’s some of each and you have to look at comparisons between categories to really be able to draw conclusions.

Unit 12

Module 65

Page 673: Notice that the term *insanity* comes out of the legal system. Insanity in criminal law means that defendants cannot be held accountable for their actions, typically due to mental disorder. It is not a psychological or medical diagnosis and does not appear in the DSM-5.

Module 66

Page 681: The AP® exam may also include references to the *psychoanalytic* and *humanistic* approaches to explaining psychological disorders. Relatively few modern therapists make use of these historically important approaches (see Module 70).

Page 682: This is a good time to review Unit I; specifically, the behavioral, biological, cognitive, and evolutionary perspectives. Be able to discuss what these approaches focus on and how they explain behavior.

Page 682: Review time: Think about the reinforcement examples provided here. Do they describe positive or negative reinforcement?

Module 67

Page 692: This is a good time to review Unit III. Consider how the use of brain scans (such as the MRI and PET) and knowledge about neurotransmitters (such as norepinephrine and serotonine) have helped us understand depression and mania.

Module 68

Page 700: When psychologists refer to “positive” and “negative” schizophrenia symptoms (as with positive and negative *reinforcement* in Unit VI), the terms *positive* and *negative* don’t mean “good” and “bad.” Symptoms are positive and negative in a mathematical sense (adding or subtracting behaviors).

Page 700: Be sure you can differentiate between hallucinations (false sensory experiences) and delusions (false beliefs).

Unit 13

Module 70

Page 723: Most of the treatments discussed in this unit come from the perspectives you’ve been learning about since Unit I. As you reach each major section—like the upcoming one on psychoanalytic and psychodynamic therapy—try to anticipate how someone from that perspective would approach therapy (for example, “What would Freud do?”). This should help you organize and retain the information as you read.

Page 723: As you read, think about the various disorders previously studied and consider how a particular form of therapy might be most effective in treating that disorder.

Page 725: You can remember *A*cceptance, *G*enuineness, and *E*mpathy as “AGE.”

Module 71

Page 730: Before you read the next several pages of this module, you may want to quickly review the material on classical and operant conditioning in Unit VI. Note that behavior therapists, like psychodynamic therapists, focus on childhood experiences, but in a different way. Behavior therapists acknowledge that conditioned responses may result from childhood experiences; psychodynamic therapists instead work on resolving unconscious conflicts stemming from childhood.

Page 734: Behavior therapies focus on what we do. Cognitive therapies focus on what we think. That’s a very basic distinction, but it is critically important for your understanding.

Page 738: Review Table 71.2. You’ll want to be able to compare and contrast the psychotherapies.

Module 73

Page 753: The discussion of drug therapies is a great opportunity for you to review information about neurotransmitters and brain function. See Unit III if you need to brush up on these topics.

Unit 14

Module 74

Page 769: Many students have not heard of the fundamental attribution error before taking a course in psychology. Be sure you can define the concept (which may appear on the AP® exam). Try illustrating this concept using your own attributions and those of others as examples.

Page 771: Be sure you can identify examples of peripheral route persuasion and central route persuasion, and that you understand the difference.

Module 75

Page 780: Three of the most famous research projects in psychology were done by social psychologists, and you’ve now read about them all. Be able to identify the major contributions of Zimbardo (from Module 74), Asch, and Milgram.

Module 76

Page 784: As you work through this material, identify examples of group behavior in your own life. Then, compare your examples with a classmate's. This is a great way to make psychology come alive and to study effectively. If you apply these terms while reading the unit, it will be easier to identify the vocabulary later.

Module 77

Page 793: It's worth spending a little time focusing on the distinction between *discrimination, prejudice*, and *stereotype*. They are related, but different. Be able to distinguish them in examples.

Page 797: Pause for a minute and try to identify examples of the just-world phenomenon, ingroup bias, and scapegoating in your own school.

Module 78

Page 802: Notice that you're back to a nature and nurture analysis again. The biology section is, of course, the nature component. When you get to the psychological and social-cultural factors coming up, that's nurture.

Page 804: This is a good opportunity to review Unit VI yet again. You should go back for a quick review if you don't recognize the basic components of operant conditioning and observational learning in this material.

Page 805: In the hitchhiker experiment described here, can you identify the independent and dependent variables? It's great practice to do this every time you read about an experiment.

Module 79

Page 808: Can you remember the other use of the term *proximity* earlier in the course? It's one of the Gestalt principles from Unit IV.

Appendix C: Psychological Science's Key Contributors

Alfred Adler, p. 583
Mary Ainsworth, p. 510
Solomon Asch, p. 776
Richard Atkinson, p. 329
Albert Bandura, p. 312, 525, 606
Diana Baumrind, p. 516
Aaron Beck, p. 734
Alfred Binet, p. 633
Paul Broca, p. 116, 388
Mary Whiton Calkins, p. 8
Walter Cannon, p. 433
Noam Chomsky, p. 383
Paul Costa, p. 599
John Darley, p. 816
Charles Darwin, p. 8
Dorothea Dix, p. 25
Carol Dweck, p. 650
Hermann Ebbinghaus, p. 327
Paul Ekman, p. 445

Albert Ellis, p. 733
Erik Erikson, p. 513
Gustav Fechner, p. 163
Leon Festinger, p. 773
Sigmund Freud, p. 10, 248, 487, 578, 723
Francis Galton, p. 633
John Garcia, p. 301
Howard Gardner, p. 627
Michael Gazzaniga, p. 120
Carol Gilligan, p. 522
G. Stanley Hall, p. 7
Harry Harlow, p. 509
Margaret Harlow, p. 509
Ernest Hilgard, p. 227
Karen Horney, p. 583
David Hubel, p. 182
William James, p. 8, 224, 433
Virginia Johnson, p. 419
Mary Cover Jones, p. 730
Carl Jung, p. 583
Daniel Kahneman, p. 372
Eric Kandel, p. 342
Alfred Kinsey, p. 419
Lawrence Kohlberg, p. 535
Wolfgang Köhler, p. 370
Bibb Latané, p. 816
Richard Lazarus, p. 435
Joseph LeDoux, p. 435
Elizabeth Loftus, p. 356
Konrad Lorenz, p. 510
Abraham Maslow, p. 11, 405, 591

William Masters, p. 419
Robert McCrae, p. 599
Stanley Milgram, p. 778
George A. Miller, p. 332
Ivan Pavlov, p. 13, 272
Jean Piaget, p. 13, 498
Steven Pinker, p. 381
Robert Rescorla, p. 303
Carl Rogers, p. 11, 591, 725
Stanley Schachter, p. 434
Martin Seligman, p. 473
Hans Selye, p. 454
Richard Shiffrin, p. 329
B. F. Skinner, p. 10, 283, 732
Charles Spearman, p. 626
Roger Sperry, p. 120
Robert Sternberg, p. 366, 628
Lewis Terman, p. 634
Edward L. Thorndike, p. 283
L. L. Thurstone, p. 626
Edward Bradford Titchener, p. 7
Edward C. Tolman, p. 304
Amos Tversky, p. 372
Lev Vygotsky, p. 503
Margaret Floy Washburn, p. 9
John B. Watson, p. 10, 272
Ernst Weber, p. 165
David Wechsler, p. 635
Carl Wernicke, p. 116, 388
Benjamin Lee Whorf, p. 389
Torsten Wiesel, p. 182

Joseph Wolpe, p. 730
Wilhelm Wundt, p. 7
Robert Zajonc, p. 434
Philip Zimbardo, p. 772

Appendix D: Preparing for Further Psychology Studies[1]

This appendix was written by Jennifer Zwolinski, University of San Diego.

In Module 3, you learned about the work that different types of psychologists do and where they do it. Here you will find answers to important questions about pursuing the study of psychology: Will psychology be the right college major for you? What are the various levels of psychology education, and what kinds of jobs are available at those levels? What are some ways you can improve your chances for college success, and for admission to graduate school?

The Psychology Major

What Could You Do With a Degree in Psychology?

Lots! As a psychology major, you would graduate with a scientific mindset and an awareness of basic principles of human behavior (biological, developmental, mental disorder–related, social). This background would prepare you for success in many areas, including business, helping professions, health services, marketing, law, sales, and teaching. You could even go on to graduate school for specialized training to become a psychology professional.

How Do You Know If Psychology Is the Right Major for You?

To see if you would be well matched with a major in psychology, start by considering the questions below.

Do you:

- enjoy learning about the ways we think and behave, and why?
- appreciate the value of applying the scientific method to answer questions?
- have an interest in a career that requires interpersonal skills?
- want to learn critical thinking and analytical skills?
- want to learn communication and presentation skills?
- want to gain computer skills in data processing, and research methodology skills such as assessment and statistics?
- want to work in human or animal services?
- have a desire to apply psychological principles to understand or solve personal, social, organizational, or environmental problems?

If you answered "yes" to most or all of these questions, then psychology may be the right major for you.

How Popular Is the Psychology Major?

Psychology is a very popular major. In 2014–2015, psychology was the fourth most popular major—6 percent of all degrees conferred. Business (19 percent), social science and history (11 percent), and health professions and related programs (8 percent) occupied the top three spots (NCES, 2016a). In 2015, more than 117,000 psychology majors graduated with a bachelor's degree from U.S. colleges and universities (NCES, 2016a) (**Figure D.1**).

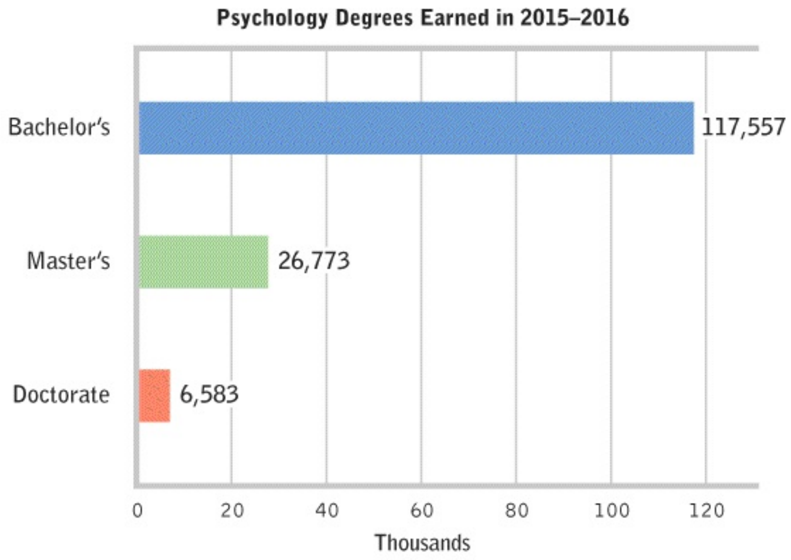


Figure D.1
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from NCES, 2016a, 2016d, 2016e.

Figure D.1 Number of psychology degrees conferred by level of degree: 2015–2016

Given that this number has been steadily increasing since 1970 (NCES, 2016a), it is very likely that psychology will remain a popular major among undergraduate students. The popularity of psychology is observed at the graduate level as well. Over the last decade, the number of graduate degrees in psychology has increased dramatically—by 32 percent at the master's level and 54 percent at the doctoral level (APA Center for Workplace Studies, 2015) (**Figure D.2**). As of 2013, of the 2.5 million workers whose highest degree was in psychology, approximately 1.4 million of them held a bachelor's degree (Christidis et al., 2016a).

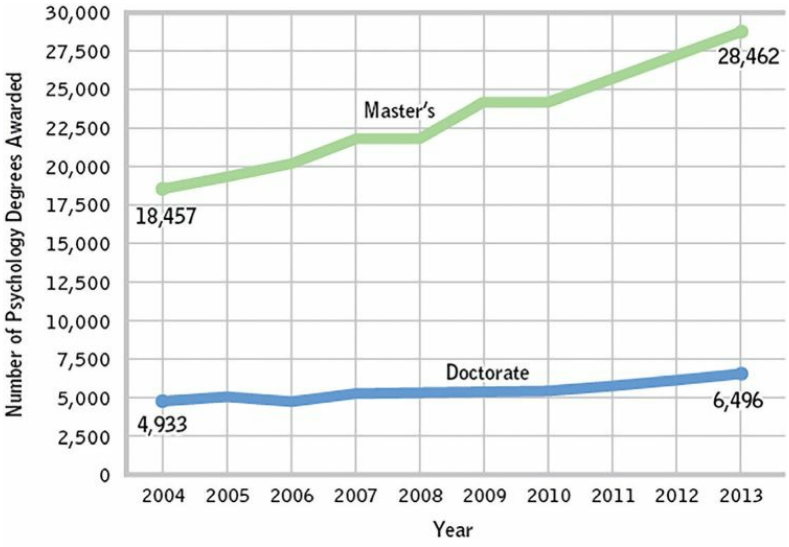


Figure D.2
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from APA Center for Workplace Studies, 2015.

Figure D.2 Number of psychology master's and doctoral degrees awarded by year: 2004–2013

Who Is Studying Psychology at the Undergraduate and Graduate Levels?

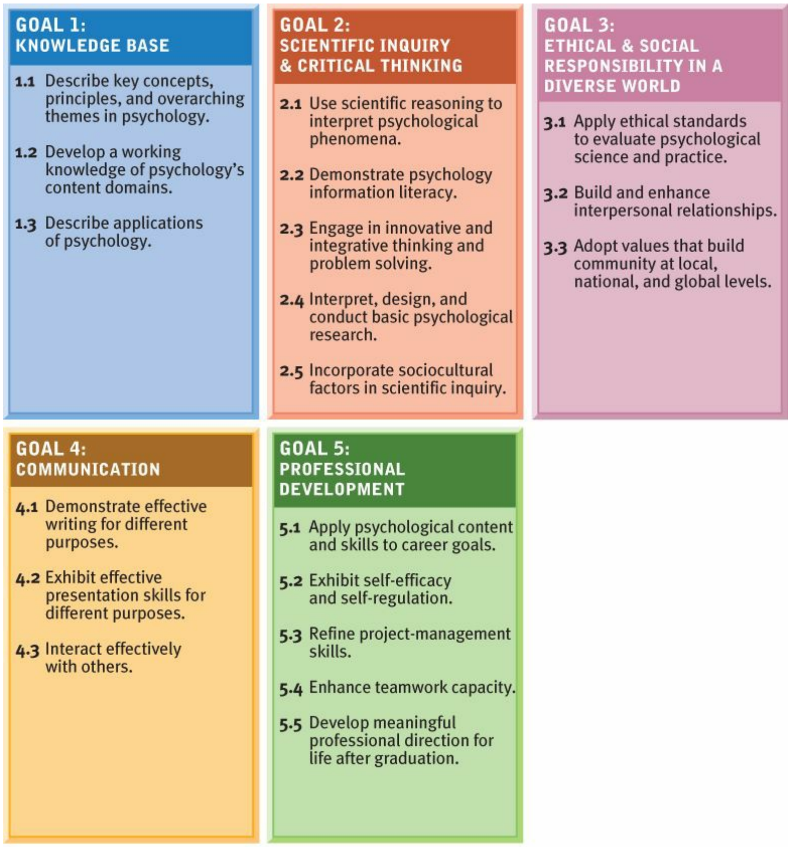
In 2015, a full 77 percent of the graduating psychology majors with bachelor's degrees were women. In that same year, approximately 79 percent of master's degree recipients were women (NCES, 2016b), and 75 percent of doctorate recipients were women (NCES, 2016c). Although 75 percent of all psychology doctorate recipients in 2015 were Caucasian, since 2005, the racial/ethnic diversity of doctorate recipients has grown, with a 12 percent increase among Black/African Americans, a 36 percent increase among Hispanics/Latinos, and a 46 percent increase among Asians (Christidis et al., 2016b).

What Are the Main Reasons That Undergraduate Students Choose to Study Psychology?

One study found that the number one reason psychology majors chose their major was a positive experience in their Introduction to Psychology class (Marrs et al., 2007). Other research has found that the top five reasons students choose a psychology major are that it provides the ability to help others, incorporates interesting subject matter, produces a better understanding of self and others, includes good career or salary potential, and offers the ability to conduct research (Mulvey & Grus, 2010).

What Types of Skills Would You Learn as a Psychology Major?

The wide range of skills that psychology majors develop makes this major a “premier choice” for versatile career preparation (Halonen, 2014). This skill set is guided by the American Psychological Association’s (APA) learning goals and outcomes for psychology majors (**Figure D.3**).



GOAL 1: KNOWLEDGE BASE

1.1 Describe key concepts, principles, and overarching themes in psychology.
1.2 Develop a working knowledge of psychology’s content domains.
1.3 Describe applications of psychology.

GOAL 2: SCIENTIFIC INQUIRY & CRITICAL THINKING

2.1 Use scientific reasoning to interpret psychological phenomena.
2.2 Demonstrate psychology information literacy.
2.3 Engage in innovative and integrative thinking and problem solving.
2.4 Interpret, design, and conduct basic psychological research.
2.5 Incorporate sociocultural factors in scientific inquiry.

GOAL 3: ETHICAL & SOCIAL RESPONSIBILITY IN A DIVERSE WORLD

3.1 Apply ethical standards to evaluate psychological science and practice.
3.2 Build and enhance interpersonal relationships.
3.3 Adopt values that build community at local, national, and global levels.

GOAL 4: COMMUNICATION

4.1 Demonstrate effective writing for different purposes.
4.2 Exhibit effective presentation skills for different purposes.
4.3 Interact effectively with others.

GOAL 5: PROFESSIONAL DEVELOPMENT

5.1 Apply psychological content and skills to career goals.
5.2 Exhibit self-efficacy and self-regulation.
5.3 Refine project-management skills.
5.4 Enhance teamwork capacity.
5.5 Develop meaningful professional direction for life after graduation.

Figure D.3
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure D.3 APA Guidelines for the Undergraduate Psychology Major: Learning Goals and Outcomes

(APA, 2013. For complete Guidelines, see apa.org/ed/precollege/about/undergraduatemajor.aspx)

Across all occupations, the skill set that twenty-first-century employers value includes social perceptiveness, reading comprehension, critical thinking, and speaking and active listening skills (Carnevale & Smith, 2014). These skills align with APA's learning goals and outcomes (Figure D.3), which means that psychology majors will be well prepared for numerous professional opportunities and a range of graduate training options. In addition to exceptional interpersonal and communication skills, psychology majors develop a number of methodological skills that result from the focus on the scientific study of human and animal behavior. The study of statistics and research methodology contributes to a scientific mindset that emphasizes exploring and managing uncertainty, critical thinking and analytical skills, and logical thinking abilities. The ability to analyze data using statistics, conduct database searches, and integrate multiple sources of information are helpful in a number of professional settings. Prospective employers appreciate the excellent written and verbal communication skills among students who present their research projects at conferences and master APA style.

Career Options with a Degree in Psychology

What Could You Do With a Bachelor's Degree in Psychology?

A psychology major would prepare you for many possible career paths. About 40 percent of students with a bachelor's degree in psychology attend graduate school or receive professional training, which means the majority of psychology majors will be in the job market after graduation (Halonen, 2014). About 10 percent of Americans with a psychology bachelor's degree work in STEM occupations (science, technology, engineering, and math), with over half of that group working in the social sciences. Another 10 percent work in STEM-*related* occupations, with most of that group working in health care (Christidis et al., 2015) (**Figure D.4**). The remaining 80 percent work in non-STEM fields (Christidis et al., 2015). Most individuals with a bachelor's degree in psychology find work in business administration, sales, or education (U.S. Bureau of Labor Statistics, 2015), with many others working in public affairs, the service industries, and computer programming (APA, n.d.). Popular occupations include employment counselor, interviewer, personnel analyst, probation officer, or writer (APA, n.d.). If you choose to work more directly in the field of psychology, a bachelor's degree will qualify you to work as an assistant to psychologists, researchers, or other professionals in community mental health centers, vocational rehabilitation offices, and correctional programs (U.S. Bureau of Labor Statistics, 2015).

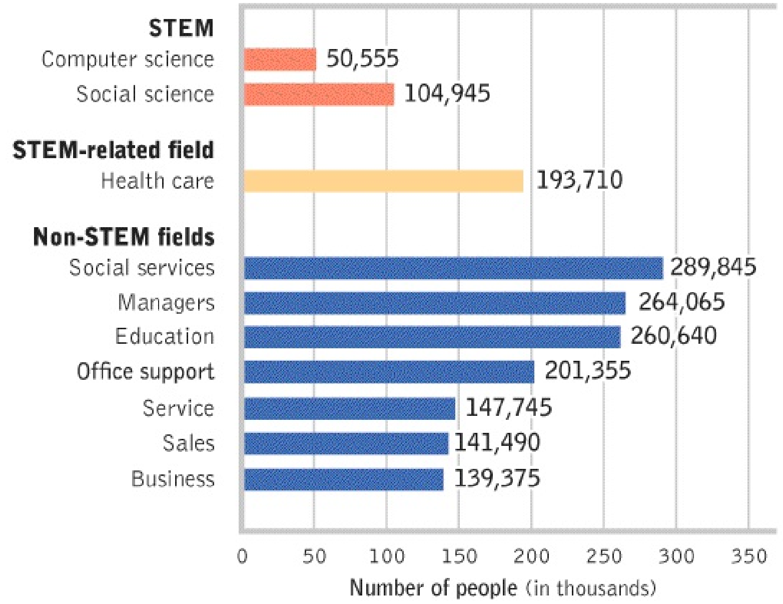


Figure D.4
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from Christidis, Stamm, & Lin, 2015.

Figure D.4 Where do people work with a bachelor's degree in psychology?

A second option for psychology majors after graduation is to pursue a graduate master's or doctorate degree in psychology. (More on this below.)

A third option is to pursue advanced training in other disciplines such as law, business, education, or medicine.

Drew Appleby provides a list of 300 careers that would be of interest to psychology majors (2016)—including those pursuing advanced degrees. The list includes links for more information about professional responsibilities, salaries, and job outlook for each of these positions. (See teachpsych.org/psycareer.)

According to 2013 data from the National Science Foundation, career paths differ depending on the type of psychology degree that individuals received (**Figure D.5**). For example, about half of individuals with graduate degrees in psychology worked in professional services, which includes positions in health care, financial and legal services, and counseling. In comparison, whereas some individuals with a bachelor’s in psychology worked in professional services, many of them worked in sales, management/supervision, and other work fields (Stamm et al., 2016).

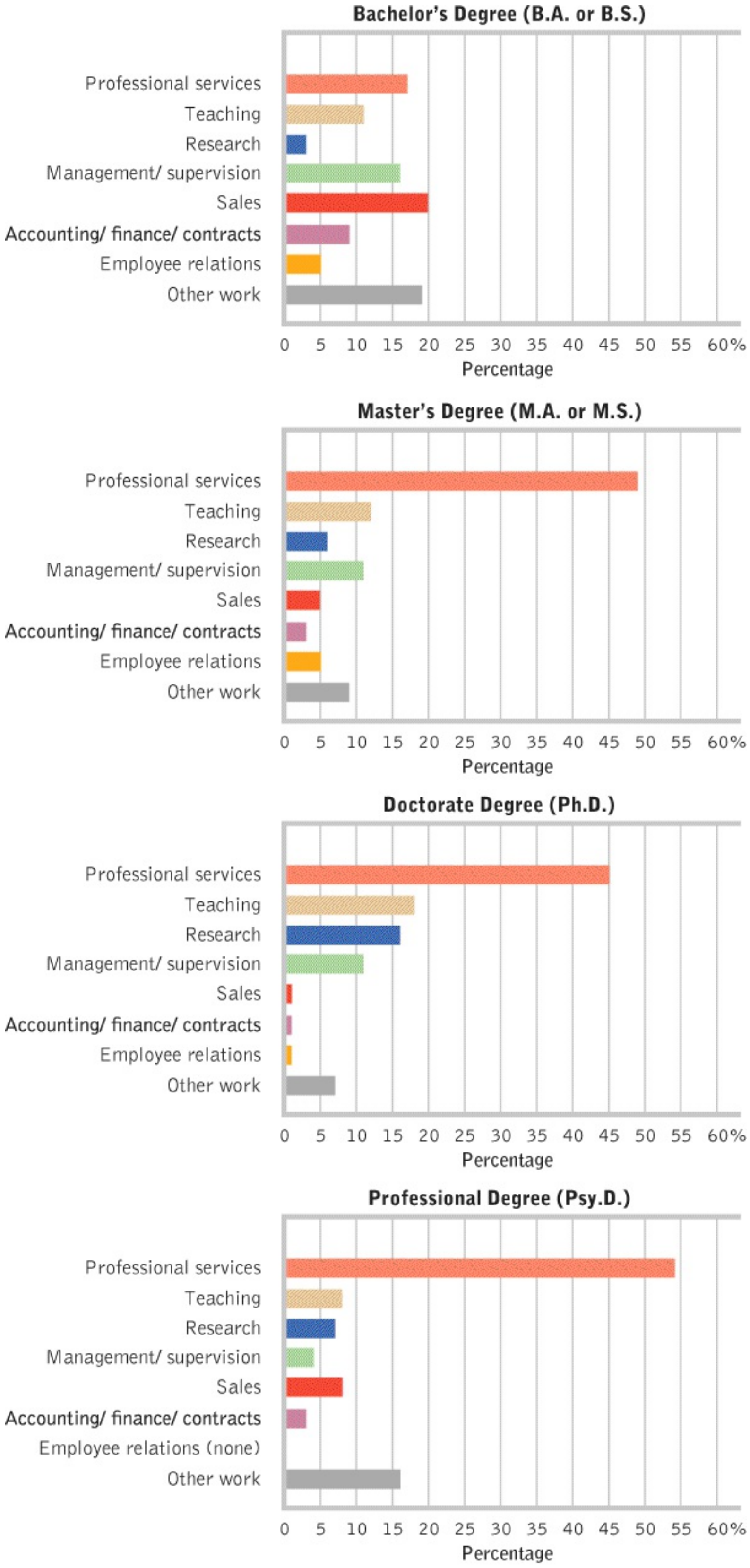


Figure D.5
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers

Figure D.5 Where do people work with varying psychology degrees?

How Can You Maximize Your College Success and Later Job Prospects With a Major in Psychology?

Betsy Morgan and Ann Korschgen (2009) offer the following helpful tips for increasing your chances of getting a job after graduation. Many of these tools will benefit students who plan to apply to graduate school as well.

1. **Get to know your instructors.** Talk with them about the field of psychology and get their advice on your career plan. Ask them to support you on an independent study internship or research project. By learning more about your skills and ambitions, faculty members can help you accomplish your goals. This may even result in an enthusiastic reference for future employment.

2. **Familiarize yourself with available resources.** Talk to alumni and senior students. Your college's Career Services can help you identify and market your job skills and emphasize your knowledge and abilities in your resume. They can also help you to network with other alumni who are working in your area of interest who can help you to prepare for the career that you want. I've included some other helpful online resources at the end of this appendix.

3. **Volunteer some of your time and talent to campus or community organizations, such as Psi Chi (the national honor society in psychology) or your college's psychology club.** In addition to showing that you are an active citizen in your department, you will gain important skills, such as meeting and event planning, how to work with a group, and improved communication skills, all of which enhance your marketability.

4. **Participate in an internship experience.** Many employers want students to gain relevant experience outside the classroom. Internships are offered during the school year as well as the summer break. Some are paid and others are not, but you may be able to earn course credit while completing your internship. In addition to gaining relevant work

experience before you graduate, you will increase your network of mentors who can provide supervision and support for your career goals as well as letters of endorsement when you apply for jobs.

5. **Take courses that support your interests and plans.** Although the psychology major offers a range of skills that will benefit you in the job market, don't assume the psychology curriculum will offer all the skills necessary to get a job in your area of interest. Add courses to increase your knowledge base and skills. This will also show prospective employers that your specific interests are in line with the demands of the job.

If you work hard now and plan ahead, you may be able to avoid regrets later. A Pew Research study asked college graduates whether (1) studying more, (2) starting their job search earlier, (3) choosing a different major, or (4) gaining more job experience during college would have helped them to get a better job (Pew Research Center, 2014). About three quarters of the group reported that doing at least one of one of these things would indeed have helped them to earn a better job. Graduates' number one regret? Not getting enough job experience during college.

What Type of Salary Could You Expect With a Degree in Psychology? Would a Graduate Degree Increase Your Income Potential?

In 2013, the average *starting* salary for a BA degree recipient was $35,108 (NCES, 2015). By comparison, the 2013 average starting salary for master's degree recipients was $51,935, and for doctoral recipients was $53,458 (NCES, 2015). In this same year, the median salary for full-time, doctoral-level psychologists was $80,000 (Lin et al., 2017). The highest salaries were for individuals with doctorates in general psychology ($110,000) and industrial/organizational psychology ($108,000), with the lowest salaries for individuals with doctorates in educational psychology ($73,000). Psychologists with a doctoral (Ph.D.) degree had a higher median salary than those with a professional (Psy. D.) degree ($84,000 vs.

$70,000) (Lin et al., 2017). Across a lifetime, individuals with a psychology bachelor’s are expected to earn $2,001,000, whereas individuals with a doctorate in psychology are expected to earn $3,157,000 (U.S. Census Bureau, 2012) (**Figure D.6**). Clearly, earnings tend to increase with education, and higher levels of education will almost always yield greater financial rewards over the course of a career (Carnevale, 2016).

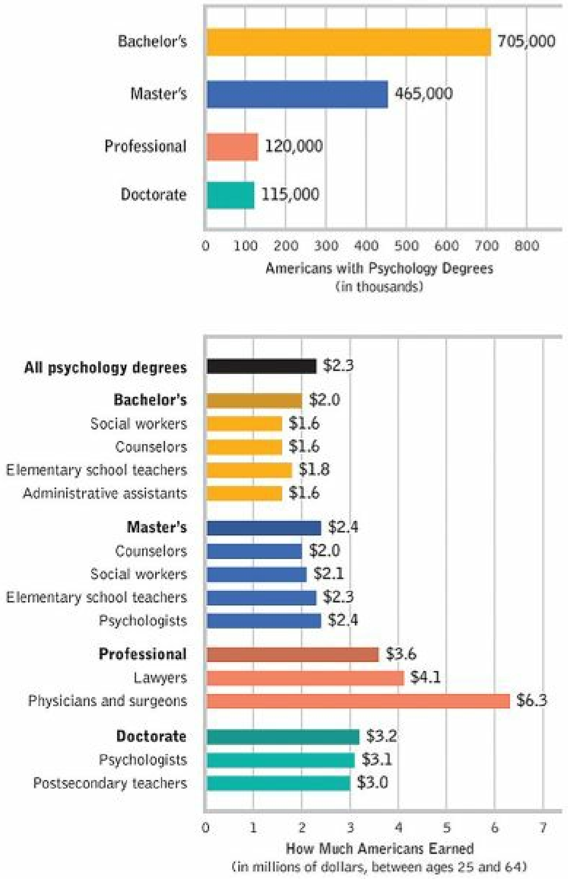


Figure D.6
Myers/DeWall, *Myers’ Psychology for the AP® Course*, 3e,
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Data from U.S. Census Bureau, 2012.

Figure D.6 Salary comparison for psychology degree pathways

Among early-career psychologists, clinical neuropsychologists reported the highest median first year salary of $72,500, followed by clinical child psychologists ($65,850), and clinical psychologists and industrial/organizational psychologists (both $65,000) (Doran et al., 2016).

Psychologists rank number seven (tied with medical scientists) among the top-paying occupations for those with doctoral degrees. The lifetime salary in 2009 dollars was $2,515,000 for graduate level psychologists, compared to the average lifetime salary for all doctoral occupations of $3,252,000 (Carnevale et al., 2011).

Of course, earning potential should not be the only reason that individuals choose a major. Job satisfaction is another important consideration.

What Kind of Job Satisfaction Could You Expect If You Work in a Psychology Field?

In 2015, an impressive 88 percent of U.S. employees reported that they were overall satisfied with their jobs, marking the highest level of job satisfaction in the last 15 years (Society for Human Resources Management, 2016). In a study of 27,000 Americans, the most satisfying jobs were those that involved “caring for, teaching, and protecting others, and creative pursuits” (Smith, 2007, pp. 1–2). Most of the occupations with the highest-ranking happiness levels involved helping others, using technical and scientific expertise, or using creativity (pp. 1–2). A bachelor’s degree in psychology can increase the likelihood that you will be working in a job that fosters these skills (Landrum, 2009).

High levels of job satisfaction have also been observed among individuals who attend graduate school in psychology. In 2009, a full 72 percent of new doctoral recipients indicated that their primary occupation was their first choice. Most new graduates with a Ph.D. are fairly satisfied with their current position in terms of salary, benefits, opportunities for personal development, supervisors, colleagues, and working conditions (Michalski et al., 2011).

Postgraduate Degrees

Why Should You Consider Attending Graduate School in Psychology?

If you choose to earn a graduate degree in psychology, you will be in good company. About 45 percent of those with a bachelor’s degree in psychology or social work go on to graduate school (Carnevale et al., 2015). Those with graduate degrees in psychology earn 33 percent more, on average, than psychology majors with only a bachelor's degree ("By the numbers," 2016). In addition to a higher salary and strong job satisfaction, a graduate degree in psychology will give you proficiency in an area of psychological specialization and increased opportunities to work in diverse areas of psychology. Also, individuals with the highest degrees in psychology have the highest rates of full-time employment (Christidis et al., 2016a).

Job prospects in the field of psychology are much better for individuals with graduate degrees. According to the U.S. Bureau of Labor Statistics (2015), job prospects will be best for those in clinical, counseling, or school psychology positions for candidates with a doctoral or education specialist degree and postdoctoral work experience. Individuals with a master's degree will face keener competition for positions in psychology than those with a doctoral degree.

Employment for psychologists is expected to grow 19 percent from 2014 to 2024, which is faster than average for all occupations. Employment will grow because of increased demand for psychological services in schools, hospitals, social service agencies, and mental health centers (U.S. Bureau of Labor Statistics, 2015).

What's the Difference Between a Master's Degree and a Doctorate Degree in Psychology?

Both degrees would prepare you for more specialized training in psychology and increase your job opportunities in the field of psychology beyond the bachelor's degree.

A master's degree in psychology requires at least two years of full-time graduate study in a specific subfield of psychology. In addition to specialized course work in psychology, requirements usually include practical experience in an applied setting or a master's thesis reporting on an original research project. You might acquire a master's degree to do specialized work in psychology. As a graduate with a master's degree, you might handle research and data collection and analysis in a university, government, or private industry setting. You might work under the supervision of a psychologist with a doctorate, providing some clinical service such as therapy or testing. Or you might find a job in the health, government, industry, or education fields. You might also acquire a master’s degree as a stepping stone for more advanced study in a doctoral program in psychology, which would expand the number of employment opportunities available to you.

It takes more time to complete a doctoral degree in psychology, relative to a master’s degree. Among graduates who earned a research doctorate (Ph.D.) in psychology in 2013, the average time to degree completion was 7 years after starting graduate school, or 8.3 years after finishing their bachelor’s degree (Lin et al., 2017). The doctoral degree you choose to pursue would depend on your career goals. You may choose to earn a doctor of philosophy (Ph.D.) in psychology if your career goals are geared toward conducting research, or a doctor of psychology (Psy.D.) if you are more interested in becoming a practicing clinician. Training for the Ph.D. culminates in a dissertation (an extensive research paper you will be required to defend orally) based on original research. Courses in quantitative research methods, which include the use of computer-based analysis, are an important part of graduate study and are necessary to complete the dissertation. Psy.D. training may be based on clinical (therapeutic) work and examinations rather than a dissertation. Many psychologists who earn a Ph.D. in clinical or counseling psychology conduct research and practice as psychotherapists. If you pursue clinical and counseling psychology programs, you should expect at least a one-year internship in addition to the regular course work, clinical practice, and research. It is important to note, however, that psychologists with Psy.D. degrees are not the only ones who work as psychotherapists; some types of counselors and therapists may practice with only master’s degrees.

Figure D.7 lists by subfield the Ph.D.s earned in the United States in 2012, the most recent year for which these data are available. Among the doctorates awarded in the 2011–2012 academic year, the most popular subfield was clinical psychology, followed by general psychology. Of these doctorates, the majority were classified as research/ scholarship (74 percent), with fewer designated as professional practice (24 percent) or other types (1 percent) (APA Center for Workplace Studies, 2014).

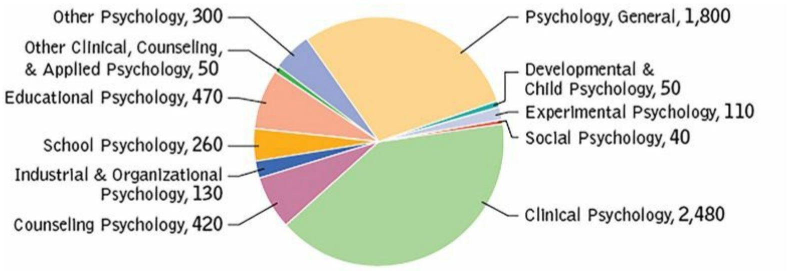

Figure D.7
Myers/DeWall, *Myers' Psychology for the AP® Course*, 3e, © 2018 Worth Publishers
Data from National Center for Education Statistics, Integrated Postsecondary Education Data System [IPEDS], 2012 Completion Survey.

Figure D.7 Number of doctorate degrees awarded by psychology subfield in 2012

Preparing Early for Graduate Study in Psychology

Competition for openings for advanced degree programs in psychology is keen. If you plan to go to graduate school after college, there are a number of things you can do in advance to maximize your chances of gaining admission to the school of your choice.

The first step is to take full advantage of your opportunities in high school. By enrolling in challenging elective courses and working hard to develop an academic skill set, you will have paved the way for success in college. Successful students also take the time to learn effective study skills and to establish disciplined study habits. Involve yourself in extracurricular activities, gain some experience in the world of work by taking on a part-time job, and look for opportunities to volunteer in your school and community. In addition to helping you grow as a person, becoming a well-rounded student with high standards helps you to earn scholarships and increases your chances of being accepted by the colleges and universities of particular interest to you.

During your first year at college, continue to maximize opportunities and obtain the experience needed to gain admission to a competitive program. Kristy Arnold and Kelly Horrigan (2002) offer a number of suggestions to facilitate this process:

1. **Network.** Get to know faculty members and the psychology department by attending activities and meetings. This will be especially helpful when you apply to graduate school or for a job, because many applications require two to three letters of reference. Become involved in psychology clubs and in Psi Chi, the national honor society in psychology. These meetings will help you connect with other students who have similar interests and expose you to a broader study of the field.
2. **Become actively involved in research as early as possible.** Start by doing simple tasks such as data entry and data collection, and over time you will be prepared to conduct your own research project under the supervision of a research mentor. Consider applying for summer research positions through your university or from other organizations such as the American Psychological Association Summer Science Fellowship program or the National Science Foundation Research Experiences for Undergraduates (REU) program, which will test your interest in academic careers and build your skills for future study in psychology.
3. **Volunteer or get a job in a psychology-related field.** Getting involved in this way will demonstrate your willingness to apply psychological concepts to real-world settings. Further, it will showcase your ability to juggle a number of tasks successfully, such as those required for work and school—an important skill for graduate school success.
4. **Maintain good grades and prepare early for the GRE.** Demonstrate your ability to do well in graduate school by successfully completing challenging courses, especially those related to your interests. (See "Use Psychology to Become a Stronger Person—and a Better Student" in Module 2, and the final section in Module 33 for tips on how to do well in this and other courses, and how to improve your retention of the information you are learning.) In your junior year of college, you

should begin studying for the Graduate Record Exam (GRE), the standardized test that applicants to graduate school must complete. Many graduate programs in psychology require both the general GRE and the psychology subject tests. If you start preparing early and maintain high grades, you will be ready for success in your graduate school application and study.

For More Information

How Can You Learn More About the Psychology Major and the Field of Psychology?

1. Talk with as many people as possible who have experience in the discipline of psychology. Your psychology teacher or school counselor may have some tips. Try to learn about opportunities to contact psychology majors, graduate students in psychology, psychology instructors and advisors, and other professionals who trained in psychology or who work in the field.
2. Read books, such as those listed at the end of this appendix.
3. Take advantage of online resources, which can help you to determine whether you would be well matched for a major and a career in psychology.
    - Watch online videos showcasing different careers in psychology, such as those found at drkit.org/psychology.
    - Play the Career Interest Game (career.missouri.edu/career-interest-game).
    - Get more information about specific jobs in psychology from the Bureau of Labor Statistics, the Occupational Information Network (O*NET), or the Occupational Outlook Handbook (OOH).
    - Visit the websites of the American Psychological Association (apa.org) and Association for Psychological Science (psychologicalscience.org). The APA has a lot to offer high school

students who are interested in learning more about psychology. To learn more about membership at the high school level (which includes subscriptions to APA journals and mobile apps), visit apa.org/membership/hs-student/index.aspx. You can also become a member of the Psychology Student Network (apa.org/ed/precollege/psn/index.aspx).

- Learn more about the national honor societies in psychology, Psi Chi and Psi Beta.

What Are Some Books That Can Help You to Learn More About the Major, Careers, and Graduate School in Psychology?

American Psychological Association. (2017). *Graduate study in psychology, 2016 edition*. Washington, DC: Author.

Hettich, P., & Landrum, R. E. (2014). *Your undergraduate degree in psychology: From college to career*. Thousand Oaks, CA: Sage.

Kuther, T., (2016). *The psychology majors handbook* (4th ed.). Boston, MA: Wadsworth Cengage.

Landrum, E., & Davis, S. (2013). *The psychology major: Career options and strategies for success* (5th ed.). Upper Saddle River, NJ: Pearson/Prentice Hall.

Morgan, B., & Korschgen, A. (2014). *Majoring in psychology? Career options for psychology undergraduates* (5th ed.). Boston, MA: Pearson.

Silvia, P. J., Delaney, P. F., & Marcovitch, S. (2016). *What psychology majors could (and should) be doing: A guide to research experience, professional skills, and your options after college* (2nd ed.). Washington, DC: American Psychological Association.

Sternberg, R. (2016). *Career paths in psychology: Where your degree path can take you* (3rd ed). Washington, DC: American Psychological Association.

Appendix E: Answers to Test Yourself Questions

Unit I

Psychology's History and Approaches

Module 1 Psychology and Its History

Page 6

Describe what's involved in critical thinking.

nswer: Evaluating evidence, assessing conclusions, and examining our own ssumptions are essential parts of critical thinking.

Page 9

What event defined the start of modern scientific psychology?

nswer: Scientific psychology began in Germany in 1879 when Wilhelm Wundt pened the first psychology laboratory.

Why did introspection fail as a method for understanding how the mind works?

nswer: People's self-reports varied, depending on the experience and the person's ntelligence and verbal ability, and because we often don't know *why* we think or eel the way we do!

The school of _____________ used introspection to define the mind's makeup; _____________ focused on how mental processes enable us to adapt, survive,

and flourish.

nswer: structuralism; functionalism

Page 11

From the 1920s to the 1960s, the two major forces in psychology were _____________ and _____________ psychology.

nswer: behaviorism; Freudian

Module 2 Today's Psychology and Its Approaches

Page 15

How did the cognitive revolution affect the field of psychology?

nswer: It recaptured the field's early interest in mental processes and made them gitimate topics for scientific study.

What is natural selection?

nswer: This is the process by which nature selects from chance variations the aits that best enable an organism to survive and reproduce in a particular nvironment.

What is contemporary psychology's position on the nature–nurture issue?

nswer: Psychological events stem from the interaction of nature and nurture, ther than from either of them acting alone.

Page 19

What advantage do we gain by using the biopsychosocial approach in studying psychological events?

nswer: By incorporating these three key viewpoints, the biopsychosocial approach an provide a more complete view than any one perspective could offer.

The_____________-_____________ perspective in psychology focuses on how behavior and thought differ from situation to situation and from culture to culture, while the _____________ perspective emphasizes observation of how we respond to and learn in different situations.

nswer: social-cultural; behavioral

Page 22

The ______________ ______________ describes the enhanced memory that results from repeated retrieval (as in self-testing) rather than from simple rereading of new information.

Answer: testing effect

What does the acronym SQ3R stand for?

Answer: *S*urvey, *Q*uestion, *R*ead, *R*etrieve, *R*eview

Module 3 Subfields in Psychology

Page 26

Match the specialty on the left with the description on the right.

1. Clinical psychology	**a. Works to create social and physical environments that are healthy for all.**
2. Psychiatry	**b. Studies, assesses, and treats people with psychological disorders but usually does not provide medical therapy.**
3. Community psychology	**c. Branch of medicine dealing with psychological disorders.**

Answer: 1, b; 2, c; 3, a

Page 31

Name each of these subfields: (a) focuses on people and their work environments; (b) studies how people change over the life span; (c) considers the human thinking involved in perceiving, remembering, speaking, and decision making; and (d) focuses on diagnosing and treating psychological disorders.

Answer: These subfields are (a) industrial-organizational psychology, (b) evelopmental psychology, (c) cognitive psychology, and (d) clinical psychology.

Unit II

Research Methods: Thinking Critically With Psychological Science

Module 4 The Need for Psychological Science

Page 40

Why, after friends start dating, do we often feel that we *knew* they were meant to be together?

nswer: We often suffer from hindsight bias—after we’ve learned a situation’s
utcome, that outcome seems familiar and therefore obvious.

Module 5 The Scientific Method and Description

Page 43

What does a good theory do?

nswer: (1) It *organizes* observed facts. (2) It implies hypotheses that offer testable
redictions and, sometimes, practical applications. (3) It often stimulates further
search.

Why is replication important?

nswer: When other investigators are able to replicate an experiment with the same
r stronger) results, scientists can confirm the result and become more confident of
s reliability.

Page 45

We cannot assume that case studies always reveal general principles that apply to all of us. Why not?

nswer: Case studies involve only one individual or group, so we can’t know for
re whether the principles observed would apply to a larger population.

Page 47

What is an unrepresentative sample, and how do researchers avoid it?

nswer: An unrepresentative sample is a group that does not represent the opulation being studied. *Random sampling* helps researchers form a representative ample, because each member of the population has an equal chance of being ncluded.

What are some strengths and weaknesses of the three different methods psychologists use to describe behavior—case studies, naturalistic observation, and surveys?

nswer: *Case studies* offer in-depth insights that may offer clues to what's true of thers—or may, if the case is atypical, mislead. *Naturalistic observation* enables the tudy of behavior undisturbed by researchers. But the lack of control may leave ause and effect ambiguous. *Surveys* can accurately reveal the tendencies of large opulations. But if the questions are leading, or if non-random samples are queried, he results can again mislead us.

Module 6 Correlation and Experimentation

Page 53

You hear the school basketball coach telling her friend that she rescued her team's winning streak by yelling at the players after an unusually bad first half. What is another explanation of why the team's performance improved?

nswer: The team's poor performance was not their typical behavior. The return to heir normal—their winning streak—may just have been a case of regression toward he mean.

Page 55

What measures do researchers use to prevent the placebo effect from confusing their results?

nswer: Research designed to prevent the placebo effect randomly assigns articipants to an *experimental group* (which receives the real treatment) or to a *ontrol group* (which receives a placebo). A double-blind procedure prevents articipants' and researchers' beliefs and hopes from affecting the results, because either the participants nor those collecting the data know who receives the placebo. A comparison of the results will demonstrate whether the real treatment produces etter results than *belief* in that treatment.

Page 57

By using *random assignment,* researchers are able to control for ______________ ______________, which are other factors besides the independent variable(s) that may influence research results.

Answer: confounding variables

Match the term on the left with the description on the right.

1. double-blind procedure

2. random sampling

3. random assignment

a. helps researchers generalize from a small set of survey responses to a larger population

b. helps minimize preexisting differences between experimental and control groups

c. controls for the placebo effect; neither researchers nor participants know who receives the real treatment

Answer: 1, c; 2, a; 3, b

Module 7 Research Design and Ethics in Psychology

Page 64

How are animal subjects and human research participants protected?

Answer: Animal protection legislation, laboratory regulation and inspection, and ocal and university ethics committees (which screen research proposals) work to afeguard animal welfare. International psychological organizations urge researchers nvolving human participants to obtain *informed consent,* protect them from greater-han-usual harm and discomfort, treat their personal information confidentially, and *ebrief* them fully at the end of the experiment.

Module 8 Statistical Reasoning in Everyday Life

Page 72

The arithmetic average of a distribution of scores is the _____________. The score that shows up most often is the _____________. The score right in the middle of a distribution (half the scores above it; half below) is the _____________. We determine how much scores vary around the average in a way that includes information about the _____________ of scores (difference between highest and lowest) by using the _____________ _____________ formula.

nswer: mean; mode; median; range; standard deviation

Can you solve this puzzle? The registrar's office at the University of Michigan has found that usually about 100 students in Arts and Sciences have perfect grades at the end of their first term at the university. However, only about 10 to 15 students graduate with perfect grades. What do you think is the most likely explanation for the fact that there are more perfect grades after one term than at graduation (Jepson et al., 1983)?

nswer: Averages based on fewer courses are more variable, which guarantees a reater number of extremely low and high grades at the end of the first term.

_____________ statistics summarize data, while _____________ statistics determine if data can be generalized to other populations.

nswer: Descriptive; inferential

Unit III

Biological Bases of Behavior

Module 9 Biological Psychology and Neurotransmission

Page 81

What do phrenology and biological psychology have in common?

nswer: They share a focus on the links between the brain and behavior. hrenology faded because it had no scientific basis—skull bumps don't reveal ental traits and abilities.

Page 84

When a neuron fires an action potential, the information travels through the axon, the dendrites, and the cell body, but not in that order. Place these three structures in the correct order.

nswer: dendrites, cell body, axon

How does our nervous system allow us to experience the difference between a slap and a tap on the back?

nswer: Stronger stimuli (the slap) cause more neurons to fire and to fire more equently than happens with weaker stimuli (the tap).

Page 86

What happens in the *synaptic gap*?

nswer: Neurons send neurotransmitters (chemical messengers) across this tiny pace between one neuron’s terminal branch and the next neuron’s dendrite or cell ody.

What is *reuptake*? What two other things can happen to excess neurotransmitters after a neuron reacts?

nswer: Reuptake occurs when excess neurotransmitters are reabsorbed by the ending neuron. They can also drift away or be broken down by enzymes.

Page 89

Serotonin, dopamine, and endorphins are all chemical messengers called ______________.

nswer: neurotransmitters

Module 10 The Nervous and Endocrine Systems

Page 93

Match the type of neuron to its description.

1. Motor neurons

a. carry incoming messages from sensory receptors to the CNS.

3. Sensory neurons	**b. communicate within the CNS and process information between incoming and outgoing messages.**
3. Interneurons	**c. carry outgoing messages from the CNS to muscles and glands.**

nswer: 1, c; 2, a; 3, b

What bodily changes does your ANS direct before and after you give an important speech?

nswer: Responding to this challenge, your ANS *sympathetic division* will arouse ou. It accelerates your heartbeat, raises your blood pressure and blood sugar, slows our digestion, and cools you with perspiration. After you give the speech, your NS *parasympathetic division* will reverse these effects.

Page 94

How does information flow through your nervous system as you pick up a fork? Can you summarize this process?

nswer: Your central nervous system's hungry brain activates and guides the uscles of your arm and hand via your peripheral nervous system's motor neurons. s you pick up the fork, your brain processes the information from your sensory ervous system, enabling it to continue to guide the fork to your mouth. The unctional circle starts with sensory input, continues with interneuron processing by e central nervous system, and finishes with motor output.

Page 96

Why is the pituitary gland called the "master gland"?

nswer: Responding to signals from the hypothalamus, the pituitary releases ormones that trigger other endocrine glands to secrete hormones, which in turn fluence brain and behavior.

How are the nervous and endocrine systems alike, and how do they differ?

nswer: Both of these communication systems produce chemical molecules that act n the body’s receptors to influence our behavior and emotions. The endocrine ystem, which secretes hormones into the bloodstream, delivers its messages much ıore slowly than the speedy nervous system, and the effects of the endocrine ystem’s messages tend to linger much longer than those of the nervous system.

Module 11 Studying the Brain, and Older Brain Structures

Page 101

Match the scanning technique with the correct description

1. fMRI scan

2. PET scan

3. MRI scan

a. tracks radioactive glucose to reveal brain *activity*.

b. tracks successive images of brain tissue to show brain *function*.

c. uses magnetic fields and radio waves to show brain *anatomy*.

ınswer: 1, b; 2, a; 3, c

Page 103

The _____________ is a crossover point where nerves from the left side of the brain are mostly linked to the right side of the body, and vice versa.

ınswer: brainstem

Page 107

What are the three key structures of the limbic system, and what functions do they serve?

ınswer: (1) The *amygdala* is involved in aggression and fear responses. (2) The *ypothalamus* is involved in bodily maintenance, pleasurable rewards, and control of ıe hormonal systems. (3) The *hippocampus* processes memory of facts and events.

Electrical stimulation of a cat’s amygdala provokes angry reactions. Which *autonomic nervous system* division is activated by such stimulation?

ınswer: The sympathetic nervous system

In what brain region would damage be most likely to (1) disrupt your ability to jump rope? (2) disrupt your ability to hear? (3) leave you in a coma? (4) cut off the very breath and heartbeat of life?

nswer: (1) cerebellum; (2) thalamus; (3) reticular formation; (4) medulla

Module 12 The Cerebral Cortex

Page 109

Which area of the human brain is most similar to that of less complex animals? Which part of the human brain distinguishes us most from less complex animals?

nswer: the brainstem; the cerebral cortex

Page 116

Our brain's ______________ cortex registers and processes body touch and movement sensations. The ______________ cortex controls our voluntary movements.

nswer: somatosensory; motor

Why are association areas important?

nswer: Association areas are involved in higher mental functions—interpreting, tegrating, and acting on information processed in other areas.

Page 118

Try moving your right hand in a circular motion, as if cleaning a table. Then start your right foot doing the same motion, synchronized with your hand. Now reverse the right foot's motion, but not the hand's. Finally, try moving the *left* foot opposite to the right hand.

1. **Why is reversing the right foot's motion so hard?**
2. **Why is it easier to move the left foot opposite to the right hand?**

nswer: 1. The right limbs' opposed activities interfere with each other because oth are controlled by the same (left) side of your brain. 2. Opposite sides of your rain control your left and right limbs, so the reversed motion causes less terference.

Module 13 Brain Hemisphere Organization and the Biology of Consciousness

Page 122

(1) If we flash a red light to the right hemisphere of a right-handed person with a split brain, and flash a green light to the left hemisphere, will each observe its own color? (2) Will the person be aware that the colors differ? (3) What will the person verbally report seeing?

nswer: (1) yes; (2) no; (3) green

Page 127

Those working in the interdisciplinary field called ______________ ______________ study the brain activity associated with the mental processes of perception, thinking, memory, and language.

nswer: cognitive neuroscience

What are the mind’s two tracks, and what is *dual processing?*

nswer: The human brain has separate conscious and unconscious tracks that
rocess information simultaneously. In vision, for example, the visual action track
ormally guides our conscious visual processing, while the visual perception track
ormally operates unconsciously, enabling our quick recognition of objects.

Module 14 Behavior Genetics: Predicting Individual Differences

Page 131

Put the following cell structures in order from smallest to largest: nucleus, gene, chromosome.

nswer: gene, chromosome, nucleus

Page 135

How do researchers use twin and adoption studies to learn about psychological principles?

nswer: Researchers use twin and adoption studies to understand how much
ariation among individuals is due to genetic makeup and how much is due to

nvironmental factors. Some studies compare the traits and behaviors of identical vins (same genes) and fraternal twins (different genes, as in any two siblings). hey also compare adopted children with their adoptive and biological parents. ome studies compare traits and behaviors of twins raised together or separately.

Page 136

Those studying the *heritability* of a trait try to determine how much of the person-to-person variation in that trait among members of a specific group is due to their differing _____________.

nswer: genes

Page 138

Match the following terms to the correct explanation.

1. Epigenetics	**a. Study of the relative effects of our genes and our environment on our behavior.**
2. Molecular behavior genetics	**b. Study of how the structure and function of specific genes interact with our environment to influence behavior.**
3. Behavior genetics	**c. Study of environmental factors that affect how our genes are expressed.**

nswer: 1, c; 2, b; 3, a

Module 15 Evolutionary Psychology: Understanding Human Nature

Page 142

How are Belyaev and Trut's fox-breeding practices similar to, and how do they differ from, the way natural selection normally occurs?

nswer: Over multiple generations, Belyaev and Trut selected and bred foxes that xhibited a trait they desired: tameness. This process is similar to naturally occurring lection, but it differs in that natural selection is much slower, and normally favors aits (including those arising from mutations) that contribute to reproduction and rvival.

Page 146

How do evolutionary psychologists explain male-female differences in sexuality?

nswer: Evolutionary psychologists theorize that females have inherited their ncestors’ tendencies to be more cautious sexually because of the challenges ssociated with incubating and nurturing offspring. Males have inherited a tendency be more casual about sex, because their act of fathering requires a smaller vestment.

What are the three main criticisms of the evolutionary explanation of human sexuality?

nswer: (1) It starts with an effect and works backward to propose an explanation.) This explanation may overlook the effects of cultural expectations and cialization. (3) Men could use such explanations to rationalize their irresponsible ehavior toward women.

Page 149

How does the biopsychosocial approach explain our individual development?

nswer: The biopsychosocial approach considers all the factors that influence our dividual development: biological factors (including evolution and our genes, ormones, and brain), psychological factors (including our experiences, beliefs, elings, and expectations), and social-cultural factors (including parental and peer fluences, cultural individualism or collectivism, and gender norms).

Unit IV

Sensation and Perception

Module 16 Basic Concepts of Sensation and Perception

Page 166

Explain how Heather Sellers' experience of prosopagnosia illustrates the difference between sensation and perception.

nswer: Heather Sellers' sensation is normal, and her perception is nearly so, but er brain is lacking the functional area that helps us recognize a familiar human ce. While her bottom-up physical sensory system receives and represents stimuli, a roblem with her top-down mental process of organizing and interpreting sensory put results in her inability to recognize faces.

Explain three attentional principles that magicians may use to fool us.

nswer: Our *selective attention* allows us to focus on only a limited portion of our rroundings. *Inattentional blindness* explains why we don't perceive some things hen we are distracted. And *change blindness* happens when we fail to notice a latively unimportant change in our environment. All these principles help agicians fool us, as they direct our attention elsewhere to perform their tricks.

Using sound as your example, explain how these concepts differ: *absolute threshold, subliminal stimulation,* and *difference threshold.*

nswer: *Absolute threshold* is the minimum stimulation needed to detect a articular sound (such as an approaching bike on the sidewalk behind you) 50 ercent of the time. *Subliminal* stimulation happens when, without your awareness, our sensory system processes a sound that is below your absolute threshold (such s when your perceptions are affected by first being primed by a subliminally heard ord). A *difference threshold* is the minimum sound difference a person can detect or example, when listening to music, how many times you need to increase the olume in order to notice the difference).

Why is it that after wearing shoes for a while, you cease to notice them?

nswer: The shoes provide constant stimulation. Thanks to *sensory adaptation,* we nd to focus primarily on changing stimuli.

Module 17 Influences on Perception

Page 174

What type of evidence shows that, indeed, "there is more to perception than

meets the senses"?

nswer: We construct our perceptions based on both sensory input and—xperiments show—on our assumptions, expectations, schemas, and perceptual sets, ften influenced by the surrounding context.

Does *perceptual set* involve bottom-up or top-down processing? Why?

nswer: It involves top-down processing, because it draws on your experiences, ssumptions, and expectations when interpreting stimuli.

If an ESP event occurred under controlled conditions, what would be the next best step to confirm that ESP really exists?

nswer: The ESP event would need to be reproduced in other scientific studies.

Module 18 Vision: Sensory and Perceptual Processing

Page 180

Some nocturnal animals, such as toads, mice, rats, and bats, have impressive night vision thanks to having many more _____________ (rods/cones) than _____________ (rods/cones) in their retinas. These creatures probably have very poor _____________ (color/black-and-white) vision.

nswer: rods; cones; color

Cats are able to open their _____________ much wider than we can, which allows more light into their eyes so they can see better at night.

nswer: pupils

Page 182

What are two key theories of color vision? Are they contradictory or complementary? Explain.

nswer: The *Young-Helmholtz trichromatic theory* shows that the retina contains olor receptors for red, green, and blue. The *opponent-process theory* shows that we ave opponent-process cells in the retina and thalamus for red-green, blue-yellow, nd white-black. These theories are complementary and outline the two stages of olor vision: (1) The retina's receptors for red, green, and blue respond to different olor stimuli. (2) The receptors’ signals are then processed by the opponent-process ells on their way to the visual cortex in the brain.

Page 185

What is the rapid sequence of events that occurs when you see and recognize a friend?

nswer: Light waves reflect off the person and travel into your eyes. Receptor cells n your retina convert the light waves’ energy into millions of neural impulses sent o your brain. Your brain’s detector cells and work teams process the subdimensions f this visual input—including color, movement, form, and depth—separately but imultaneously. Your brain interprets this information, based on previously stored nformation and your expectations, and forms a conscious perception of your friend.

Module 19 Visual Organization and Interpretation

Page 195

In terms of perception, a band’s lead singer would be considered ______________ (figure/ground), and the other musicians would be considered ______________ (figure/ground).

nswer: figure; ground

What do we mean when we say that, in perception, “the whole may exceed the sum of its parts”?

nswer: Gestalt psychologists used this saying to describe our perceptual tendency o organize clusters of sensations into meaningful forms or coherent groups.

How do we normally perceive depth?

nswer: We are normally able to perceive depth thanks to (1) binocular cues (such s retinal disparity), and (2) monocular cues (which include relative height, relative ize, interposition, linear perspective, light and shadow, and relative motion).

Module 20 Hearing

Page 203

What are the basic steps in transforming sound waves into perceived sound?

nswer: The *outer ear* collects sound waves, which are translated into mechanical aves by the *middle ear* and turned into fluid waves in the *inner ear*. The *auditory erve* then translates the energy into electrical waves and sends them to the brain, hich perceives and interprets the sound.

The amplitude of a sound wave determines our perception of ____________ (loudness/pitch).

nswer: loudness

The longer the sound waves, the ____________ (lower/higher) their frequency and the ____________ (higher/lower) their pitch.

nswer: lower; lower

Which theory of pitch perception would best explain a symphony audience's enjoyment of a high-pitched piccolo? How about a low-pitched cello?

nswer: place theory; frequency theory

Module 21 The Other Senses

Page 216

Which of the following options has NOT been proven to reduce pain? a. Distraction b. Placebos c. Phantom limb sensations d. Endorphins

nswer: c

Where are the kinesthetic receptors and the vestibular sense receptors located?

nswer: Kinesthetic receptors are located in our joints, tendons, and muscles. estibular sense receptors are located in our inner ear.

Unit V

Consciousness and the Two-Track Mind

Module 22 Understanding Consciousness and Hypnosis

Page 228

When is hypnosis potentially harmful, and when can hypnosis be used to help?

nswer: Hypnosis can be harmful if used to “hypnotically refresh” memories, hich may plant false memories. But posthypnotic suggestions have helped alleviate ome ailments, and hypnosis can also help control pain.

Hilgard believed that hypnosis involves a state of divided consciousness called ______________. His beliefs have been challenged by researchers who suggest ______________ influence is involved.

nswer: dissociation; social

Module 23 Sleep Patterns and Sleep Theories

Page 236

What are the four sleep stages, and in what order do we normally travel through those stages?

nswer: NREM-1, NREM-2, NREM-3, REM; normally we move through NREM-, then NREM-2, then NREM-3, then back up through NREM-2 before we xperience REM sleep.

Can you match the cognitive experience with the sleep stage?

1. NREM-1 **a. story-like dream**

2. NREM-3 **b. fleeting images**

3. REM **c. minimal awareness**

nswer: 1, b; 2, c; 3, a

The ______________ nucleus helps monitor the brain’s release of melatonin, which affects our ______________ rhythm.

nswer: suprachiasmatic; circadian

Page 238

What are five proposed reasons for our need for sleep?

nswer: (1) Sleep has survival value. (2) Sleep helps us restore the immune system nd repair brain tissue. (3) During sleep we consolidate memories. (4) Sleep fuels reativity. (5) Sleep plays a role in the growth process.

Module 24 Sleep Deprivation, Sleep Disorders, and Dreams

Page 247

A well-rested person would be more likely to have ____________ (trouble concentrating/quick reaction times) and a sleep-deprived person would be more likely to ____________ (gain weight/fight off a cold).

nswer: quick reaction times; gain weight

Page 251

Are you getting enough sleep? What might you ask yourself to answer this question?

nswer: You could start with the true/false questions in James Maas’ sleep eprivation quiz in Table 24.1. Also, William Dement (1999, p. 73) has suggested onsidering these questions: “How often do you think about taking a quick snooze? low often do you rub your eyes and yawn during the day? How often do you feel ke you really need some coffee?” Dement concluded that “each of these is a arning of a sleep debt that you ignore at your peril.”

What five theories propose explanations for why we dream?

nswer: (1) Freud’s wish-fulfillment (dreams as a psychic safety valve), (2) nformation-processing (dreams sort the day’s events and consolidate memories), (3) hysiological function (dreams pave neural pathways), (4) activation-synthesis REM sleep triggers random neural activity that the mind weaves into stories), and 5) cognitive development (dreams reflect the dreamer’s developmental stage)

Module 25 Psychoactive Drugs

Page 255

What is the process that leads to drug tolerance?

nswer: With repeated exposure to a psychoactive drug, the user’s brain chemistry dapts and the drug’s effect lessens. Thus, it takes bigger doses to get the desired ffect.

Can someone become “addicted” to shopping?

nswer: Unless it becomes compulsive or dysfunctional, simply having a strong terest in shopping is not the same as having a physical addiction to a drug. It pically does not involve obsessive craving in spite of known negative onsequences.

Page 257

Alcohol, barbiturates, and opiates are all in a class of drugs called ______________.

nswer: depressants

Page 259

What withdrawal symptoms should your friend expect when she finally decides to quit smoking?

nswer: Nicotine-withdrawal symptoms include strong cravings, insomnia, anxiety, ritability, distractibility, and difficulty concentrating. However, if your friend icks with it, the craving and withdrawal symptoms will gradually dissipate over bout six months.

Page 264

Why do tobacco companies try so hard to get customers hooked as teens?

nswer: Nicotine is powerfully addictive, expensive, and deadly. Those who start aving the neural pathways when young may find it very hard to stop using nicotine. s a result, tobacco companies may have lifelong customers.

“How strange would appear to be this thing that men call pleasure! And how curiously it is related to what is thought to be its opposite, pain! . . . Wherever the one is found, the other follows up behind.” (Plato, *Phaedo,* fourth century B.C.E.) How does this pleasure-pain description apply to the repeated use of psychoactive drugs?

nswer: Psychoactive drugs create pleasure by altering brain chemistry. With peated use of the drug, the user develops tolerance and needs more of the drug to chieve the desired effect. (Marijuana is an exception.) Discontinuing use of the ubstance then produces painful or psychologically unpleasant withdrawal ymptoms.

Unit VI

Learning

Module 26 How We Learn and Classical Conditioning

Page 272

Why are habits, such as having something sweet with that cup of coffee, so hard to break? (Hint: Think about learned associations.)

nswer: Habits form when we repeat behaviors in a given context and, as a result, earn associations—often without our awareness. For example, we may have eaten a weet pastry with a cup of coffee often enough to associate the flavor of the coffee ith the treat, so that the cup of coffee alone just doesn't seem right anymore!

As we develop, we learn cues that lead us to expect and prepare for good and bad events. We learn to repeat behaviors that bring rewards. And we watch others and learn. What do psychologists call these three types of learning?

nswer: Through *classical conditioning*, we learn cues that lead us to expect and repare for good and bad events. Through *operant conditioning*, we learn to repeat ehaviors that bring rewards. Through *cognitive learning*, we watch others and earn.

Page 274

An experimenter sounds a tone just before delivering an air puff that causes your eye to blink. After several repetitions, you blink to the tone alone. What is the NS? The US? The UR? The CS? The CR?

nswer: NS = tone before conditioning; US = air puff; UR = blink to air puff; CS = ne after conditioning; CR = blink to tone

Page 276

If the aroma of a baking cake sets your mouth to watering, what is the US? The CS? The CR?

nswer: The cake (including its taste) is the US. The associated aroma is the CS. alivation to the aroma is the CR.

The first step of classical conditioning, when an NS becomes a CS, is called _____________. When a US no longer follows the CS, and the CR becomes weakened, this is called _____________.

nswer: acquisition, extinction

Page 278

In horror movies, sexually arousing images of women are sometimes paired with violence against women. Based on classical conditioning principles, what might be an effect of this pairing?

nswer: If viewing an attractive nude or seminude woman (a US) elicits sexual rousal (a UR), then pairing the US with a new NS (violence) could turn the iolence into a conditioned stimulus (CS) that also becomes sexually arousing, a onditioned response (CR).

Module 27 Operant Conditioning

Page 283

With classical conditioning, we learn associations between events we _____________ (do/do not) control. With operant conditioning, we learn associations between our behavior and _____________ (resulting/random) events.

nswer: do not; resulting

Page 289

People who send spam e-mail are reinforced by which schedule? Home bakers checking the oven to see if the cookies are done are on which schedule? Sandwich shops that offer a free sandwich after every 10 sandwiches purchased are using which reinforcement schedule?

nswer: Spammers are reinforced on a variable-ratio schedule (after sending a arying number of e-mails). Cookie checkers are reinforced on a fixed-interval chedule. Sandwich shop programs use a fixed-ratio schedule.

Page 291

Fill in the three blanks below with one of the following terms: positive reinforcement (PR), negative reinforcement (NR), positive punishment (PP), and negative punishment (NP). We have provided the first answer (PR) for you.

Type of Stimulus	Give It	Take It Away
Desired (for example, a teen's use of the car):	1. PR	2.
Undesired/aversive (for example, an insult):	3.	4.

nswer: 1. PR (positive reinforcement); 2. NP (negative punishment); 3. PP ositive punishment); 4. NR (negative reinforcement)

Module 28 Operant Conditioning's Applications, and Comparison to Classical Conditioning

Page 297

Ethan constantly misbehaves at preschool even though his teacher scolds him repeatedly. Why does Ethan's misbehavior continue, and what can his teacher do to stop it?

nswer: If Ethan is seeking attention, the teacher's scolding may be reinforcing ther than punishing. To change Ethan's behavior, his teacher could offer einforcement (such as praise) each time he behaves well. The teacher might ncourage Ethan toward increasingly appropriate behavior through shaping, or by ephrasing rules as rewards instead of punishments. ("You can have a snack if you lay nicely with the other children" [reward] rather than "You will not get a snack if ou misbehave!" [punishment].)

Page 297

Salivating in response to a tone paired with food is a(n) ______________

behavior; pressing a bar to obtain food is a(n) _____________ behavior.

nswer: respondent *(classically conditioned);* operant

Module 29 Biology, Cognition, and Learning

Page 302

How did Garcia and Koelling’s taste-aversion studies help disprove Gregory Kimble’s early claim that “just about any activity of which the organism is capable can be conditioned . . . to any stimulus that the organism can perceive”?

nswer: Garcia and Koelling demonstrated that rats may learn an aversion to tastes, n which their survival depends, but not to sights or sounds.

Page 306

Instinctive drift and latent learning are examples of what important idea?

nswer: The success of operant conditioning is affected not just by environmental ues, but also by biological and cognitive factors.

Page 310

To cope with stress when we feel in control of our world, we tend to use _____________-focused (emotion/problem) strategies. To cope with stress when we believe we cannot change a situation, we tend to use _____________-focused (emotion/problem) strategies.

nswer: problem; emotion

Module 30 Observational Learning

Page 318

Jason’s parents and older friends all drive over the speed limit, but they advise him not to. Juan’s parents and friends drive within the speed limit, but they say nothing to deter him from speeding. Will Jason or Juan be more likely to speed?

nswer: Jason may be more likely to speed. Observational learning studies suggest at children tend to do as others do and say what they say.

Match the examples (1–5) to the appropriate underlying learning principle (a–e):

a. Classical conditioning	**1. Knowing the way from your bed to the bathroom in the dark**
b. Operant conditioning	**2. Your little brother getting in a fight after watching a violent action movie**
c. Latent learning	**3. Salivating when you smell brownies in the oven**
d. Observational learning	**4. Disliking the taste of chili after becoming violently sick a few hours after eating chili**
e. Biological predispositions	**5. Your dog racing to greet you on your arrival home**

nswer: 1, c; 2, d; 3, a; 4, e; 5, b

Unit VII

Cognition

Module 31 Studying and Encoding Memories

Page 328

Multiple-choice questions test our ______________. Fill-in-the-blank questions test our ______________.

nswer: recognition; recall

If you want to be sure to remember what you're learning for an upcoming test, would it be better to use *recall* or *recognition* to check your memory? Why?

nswer: It would be better to test your memory with *recall* (such as with short-nswer or fill-in-the-blank self-test questions) rather than *recognition* (such as with ultiple-choice questions). Recalling information is harder than recognizing it. So if ou can recall it, that means your retention of the material is better—and so are the dds of your later recognizing the correct answer. Your chances of test success are erefore greater.

Page 330

Memory includes (in alphabetical order) long-term memory, sensory memory, and working/short-term memory. What's the correct order of these in the three-stage memory model?

nswer: sensory memory, working/short-term memory, long-term memory

How does the working memory **concept update the classic Atkinson-Shiffrin three-stage information-processing model?**

nswer: The newer idea of a *working memory* emphasizes the active processing at we now know takes place in Atkinson-Shiffrin's short-term memory stage. hile the Atkinson-Shiffrin model viewed short-term memory as a temporary olding space, working memory plays a key role in processing new information and onnecting it to previously stored information.

What are two basic functions of working memory?

nswer: (1) Active processing of incoming visual and auditory information, and (2) cusing our spotlight of attention.

Page 335

What is the difference between *automatic* and *effortful* processing, and what are some examples of each?

nswer: *Automatic* processing occurs unconsciously (automatically) for such things s the sequence and frequency of a day's events, and reading and comprehending ords in our own language(s). *Effortful* processing requires attention and awareness nd happens, for example, when we work hard to learn new material in class, or new nes for a play.

At which of Atkinson-Shiffrin's three memory stages would *iconic* and *echoic* memory occur?

nswer: sensory memory

Page 337

What would be the most effective strategy to learn and retain a list of names of key historical figures for a week? For a year?

nswer: For a week: Make the names personally meaningful. For a year: Take dvantage of the spacing effect by spreading your learning over several months.

If you try to make the material you are learning personally meaningful, are you processing at a shallow or a deep level? Which level leads to greater retention?

nswer: Making material personally meaningful involves processing at a deep vel, because you are processing *semantically*—based on the meaning of the words. eep processing leads to greater retention.

Module 32 Storing and Retrieving Memories

Page 344

Which parts of the brain are important for implicit memory processing, and which parts play a key role in explicit memo**ry processing?**

nswer: The cerebellum and basal ganglia are important for *implicit* memory rocessing, and the frontal lobes and hippocampus are key to *explicit* memory rocessing.

Your friend has experienced brain damage in an accident. He can remember how to tie his shoes but has a hard time remembering anything you tell him during a conversation. How can implicit versus explicit information processing explain what’s going on here?

nswer: Our *explicit* conscious memories of facts and episodes differ from our *nplicit* memories of skills (such as tying shoelaces) and classically conditioned sponses. The parts of the brain involved in explicit memory processing (the frontal bes and hippocampus) may have sustained damage in the accident, while the parts volved in implicit memory processing (the cerebellum and basal ganglia) appear to ave escaped harm.

Which brain area responds to stress hormones by helping to create stronger

memories?

nswer: amygdala

Increased efficiency at the synapses is evidence of the neural basis of learning and memory. This is called ______________-______________ ______________.

nswer: long-term potentiation

Page 347

You have just watched a movie that includes a chocolate factory. After the chocolate factory is out of mind, you nevertheless feel a strange urge for a chocolate bar. How do you explain this in terms of priming?

nswer: Priming is the activation (often without our awareness) of associations. eeing a chocolate factory in a movie, for example, might temporarily predispose ou to crave a chocolate treat. Although you might not consciously remember the hocolate factory, it may prime how you interpret or recall events.

When we are tested immediately after viewing a list of words, we tend to recall the first and last items best, which is known as the ______________ ______________ effect.

nswer: serial position

Module 33 Forgetting, Memory Construction, and Improving Memory

Page 356

What are three ways we forget, and how does each of these happen?

nswer: (1) *Encoding failure:* Unattended information never entered our memory ystem. (2) *Storage decay:* Information fades from our memory. (3) *Retrieval ilure:* We cannot access stored information accurately, sometimes due to terference or motivated forgetting.

You will experience less ______________ (proactive/retroactive) interference if you learn new material in the hour before sleep than you will if you learn it before turning to another subject.

nswer: retroactive

Freud believed that we _____________ unacceptable memories to minimize anxiety.

nswer: repress

Page 361

What—given the commonness of source amnesia—might life be like if we remembered all our waking experiences and all our dreams?

nswer: Real experiences would be confused with those we dreamed. When seeing omeone we know, we might therefore be unsure whether we were reacting to omething they previously did or to something we dreamed they did.

Imagine being a jury member in a trial for a parent accused of sexual abuse based on a recovered memory. What insights from memory research should you offer the jury?

nswer: It will be important to remember the key points agreed upon by most esearchers and professional associations: Sexual abuse, injustice, forgetting, and emory construction all happen; recovered memories are common; memories from ur first four years are unreliable; memories claimed to be recovered through ypnosis are especially unreliable; and memories, whether real or false, can be motionally upsetting.

Page 363

What memory strategies can help you study smarter and retain more information?

nswer: Spend more time rehearsing or actively thinking about the material to oost long-term recall. Schedule spaced (not crammed) study times. Make the aterial personally meaningful, with well-organized and vivid associations. Refresh our memory by returning to contexts and moods that activate retrieval cues. Use nemonic devices. Minimize interference. Plan for a complete night’s sleep. Test ourself repeatedly—retrieval practice is a proven retention strategy.

Module 34 Thinking, Concepts, and Creativity

Page 368

According to Robert Sternberg, what are the five components of creativity?

nswer: Sternberg identified expertise, imaginative thinking skills, a venturesome ersonality, intrinsic motivation, and a creative environment as the five components f creativity.

Module 35 Solving Problems and Making Decisions

Page 379

Why is news so often focused on “something that hardly ever happens”? How does knowing this help us assess our fears?

nswer: If a tragic event such as a plane crash makes the news, it is noteworthy and nusual, unlike much more common bad events, such as traffic accidents. Knowing is, we can worry less about unlikely events and think more about improving the fety of our everyday activities. (For example, we can wear a seat belt when in a ehicle and use the crosswalk when walking.)

Match the process or strategy listed below (1–10) with its description (a–j).

1. Algorithm

2. Intuition

3. Insight

4. Heuristic

5. Fixation

a. Inability to view problems from a new angle; focuses thinking but hinders creative problem solving.

b. Methodological rule or procedure that guarantees a solution but requires time and effort.

c. Your fast, automatic, effortless feelings and thoughts based on your experience; huge and adaptive but can lead you to overfeel and underthink.

d. Simple thinking shortcut that enables quick and efficient decisions but puts us at risk for errors.

e. Sudden Aha! reaction that instantly

	reveals the solution.
6. Confirmation bias	**f. Tendency to search for support for your own views and to ignore contradictory evidence.**
7. Overconfidence	**g. Holding on to your beliefs even after they are proven wrong; closing your mind to new ideas.**
8. Creativity	**h. Overestimating the accuracy of your beliefs and judgments; allows you to be happier and to make decisions more easily, but puts you at risk for errors.**
9. Framing	**i. Wording a question or statement so that it evokes a desired response; can mislead people and influence their decisions.**
10. Belief perseverance	**j. The ability to produce novel and valuable ideas.**

nswer: 1, b; 2, c; 3, e; 4, d; 5, a; 6, f; 7, h; 8, j; 9, i; 10, g

Module 36 Thinking and Language

Page 382

How many morphemes are in the word *cuts*? How many phonemes?

nswer: two morphemes—*cut* and *s*, and four phonemes—*c*, *u*, *t*, and *s*

Page 387

What was the premise of researcher Noam Chomsky's work in language development?

nswer: Chomsky took the nature side of this discussion, when most other esearchers have emphasized the influence of nurture in language development. homsky maintained that all languages share a universal grammar, and humans are iologically predisposed to learn the grammar rules of language.

Why is it so difficult to learn a new language in adulthood?

nswer: Our brain’s *critical period* for language learning is in childhood, when we an absorb language structure almost effortlessly. As we move past that stage in our rain’s development, our ability to learn a new language diminishes dramatically.

What is the difference between *receptive* and *productive* language, and when do children normally hit these milestones in language development?

nswer: Infants normally start developing *receptive language* skills (ability to nderstand what is said to and about them) around 4 months of age. Then, starting ith babbling at 4 months and beyond, infants normally start building *productive nguage* skills (ability to produce sounds and eventually words).

Page 389

If children are not yet speaking, is there any reason to think they would benefit from parents and other caregivers reading to them?

nswer: Indeed there is, because well before age 1 children are learning to detect ords among the stream of spoken sounds and to discern grammatical rules. Before ge 1, they also are babbling with the phonemes of their own language. More than any parents realize, their infants are soaking up language. As researcher Peter sczyk reminds us, “Little ears are listening.”

______________ ______________ is one part of the brain that, if damaged, might impair your ability to speak words. Damage to ______________ ______________ might impair your ability to understand language.

nswer: Broca’s area; Wernicke’s area

Page 392

To say that “words are the mother of ideas” assumes the truth of what concept?

nswer: This phrase supports the linguistic determinism hypothesis, which asserts at language determines thought. Research indicates that this position is too xtreme, but—as linguistic influence suggests—language does influence what we erceive and think.

What is mental practice, and how can it help you to prepare for an upcoming event?

nswer: Mental practice uses visual imagery to mentally rehearse future behaviors, ctivating some of the same brain areas used during the actual behaviors. isualizing the details of the process is more effective than visualizing only your nd goal.

Unit VIII

Motivation, Emotion, and Stress

Module 37 Motivational Concepts

Page 404

Performance peaks at lower levels of arousal for difficult tasks, and at higher levels for easy or well-learned tasks. (1) How might this phenomenon affect marathon runners? (2) How might this phenomenon affect anxious test-takers facing a difficult test?

nswer: (1) Well-practiced runners tend to excel when aroused by competition. (2) igh anxiety about a difficult test may disrupt test-takers’ performance.

Page 406

An older friend recounted his weekend experience. After hours of driving to visit a friend he could not find anywhere to stop. Finally, he spotted a dimly lit diner. Although it looked deserted and a little creepy, he went in anyway because he was *really* hungry and thirsty. How would Maslow’s hierarchy of needs explain his behavior?

nswer: According to Maslow, the friend’s belongingness needs motivated the trip. is physiological needs of hunger and thirst took priority over his safety needs, rompting him to take a risk and enter the uninviting diner.

Module 38 Hunger Motivation

Page 411

Hunger occurs in response to _____________ (low/high) blood glucose and _____________ (low/high) levels of ghrelin.

nswer: low; high

Page 416

Why can two people of the same height, age, and activity level maintain the same weight, even if one of them eats much less than the other does?

nswer: Genetically influenced set/settling points, metabolism, and other factors fluence the way our bodies burn calories. Sleep deprivation, which makes us more ulnerable to weight gain, may also factor in.

You skipped lunch to meet with your guidance counselor, so you haven’t eaten anything in eight hours. As your long-awaited favorite dish is placed in front of you, your mouth waters in anticipation. Why?

nswer: You have learned to respond to the sight and aroma that signal the food bout to enter your mouth. Both *physiological* cues (low blood sugar) and *sychological* cues (anticipation of the tasty meal) heighten your experienced unger.

Module 39 Sexual Motivation

Page 421

The primary male sex hormone is _____________. The primary female sex hormones are the _____________.

nswer: testosterone; estrogens

What factors influence our sexual motivation and behavior?

nswer: Influences include biological factors such as sexual maturity and sex ormones, psychological factors such as environmental stimuli and fantasies, and ocial-cultural factors such as the values and expectations absorbed from family and e surrounding culture.

How might the drive-reduction theory and arousal theory explain our sexual

motivation?

nswer: *Drive-reduction theory:* Hormonal influences create a driven hysiologically aroused) state that compels us to reduce the drive. *Arousal theory:* eople sometimes *seek* the pleasure and stimulation of arousal.

Module 40 Affiliation and Achievement

Page 428

How have students reacted in studies where they were made to feel rejected and unwanted? What helps explain these results?

nswer: They engaged in more self-defeating behaviors and displayed more isparaging and aggressive behavior. These students' basic *need to belong* seems to ave been disrupted.

Social networking tends to _____________ (strengthen/weaken) your relationships with people you already know and _____________ (increase/decrease) your self-disclosure.

nswer: strengthen; increase

Page 430

What have researchers found to be an even better predictor of school performance than intelligence test scores?

nswer: self-discipline (*grit*)

How might drive-reduction theory and arousal theory explain our affiliation and achievement needs?

nswer: *Drive-reduction theory:* Being threatened and afraid drives us to find fety in the company of others (thus reducing our aroused state). *Arousal theory:* e welcome optimal levels of arousal, and the presence of others is arousing.

Module 41 Theories and Physiology of Emotion

Page 436

According to the Cannon-Bard theory, (a) our *physiological response* to a stimulus (for example, a pounding heart), and (b) the *emotion* we experience

(for example, fear) occur _____________ (simultaneously/sequentially). According to the James-Lange theory, (a) and (b) occur _____________ (simultaneously/sequentially).

nswer: simultaneously; sequentially (first the physiological response, and then the xperienced emotion)

According to Schachter and Singer, two factors lead to our experience of an emotion: (1) physiological arousal and (2) _____________ appraisal.

nswer: cognitive

Emotion researchers have disagreed about whether emotional responses occur in the absence of cognitive processing. How would you characterize the approach of each of the following researchers: Zajonc, LeDoux, Lazarus, Schachter, and Singer?

nswer: Zajonc and LeDoux suggested that we experience some emotions without ny conscious, cognitive appraisal. Lazarus, Schachter, and Singer emphasized the nportance of appraisal and cognitive labeling in our experience of emotion.

Page 440

How do the two divisions of the autonomic nervous system affect our emotional responses?

nswer: The *sympathetic division* of the ANS arouses us for more intense xperiences of emotion, pumping out the stress hormones epinephrine and orepinephrine to prepare our body for fight or flight. The *parasympathetic division* f the ANS takes over when a crisis passes, restoring our body to a calm hysiological and emotional state.

Module 42 Expressing Emotion

Page 448

_____________ (Women/Men) report experiencing emotions more deeply, and they tend to be more adept at reading nonverbal behavior.

nswer: Women

Are people more likely to differ culturally in their interpretations of facial expressions, or of gestures?

nswer: gestures

Module 43 Stress and Illness

Page 455

The stress response system: When alerted to a negative, uncontrollable event, our _____________ nervous system arouses us. Heart rate and respiration _____________ (increase/decrease). Blood is diverted from digestion to the skeletal _____________. The body releases sugar and fat. All this prepares the body for the _____________ – _____________ – _____________response.

nswer: sympathetic; increase; muscles; fight-or-flight

Page 458

The field of _____________ studies mind-body interactions, including the effects of psychological, neural, and endocrine functioning on the immune system and overall health.

nswer: psychoneuroimmunology

What general effect does stress have on our health?

nswer: Stress tends to reduce our immune system’s ability to function properly, so at higher stress generally leads to greater risk of physical illness.

Page 462

Which component of the Type A personality has been linked most closely to coronary heart disease?

nswer: feeling angry and negative much of the time

Module 44 Health and Happiness

Page 472

What are some of the tactics we can use to successfully manage the stress we cannot avoid?

nswer: aerobic exercise, relaxation procedures, mindfulness meditation, and eligious engagement

Page 478

Which of the following factors does NOT predict self-reported happiness?

- **a. Age**
- **b. Personality traits**
- **c. Sleep and exercise**
- **d. Active religious faith**
- **e. Engaging work and leisure**

nswer: Age does NOT effectively predict happiness levels. Better predictors are ersonality traits, sleep and exercise, religious faith, and engaging work and leisure.

Unit IX

Developmental Psychology

Module 45 Developmental Issues, Prenatal Development, and the Newborn

Page 488

Developmental researchers who emphasize learning and experience are supporting ______________; those who emphasize biological maturation are supporting ______________.

nswer: continuity; stages

What findings in psychology support (1) the stage theory of development and (2) the idea of stability in personality across the life span?

nswer: (1) Stage theory is supported by the work of Piaget (cognitive evelopment), Kohlberg (moral development), and Erikson (psychosocial evelopment). (2) Some traits, such as temperament, exhibit remarkable stability cross many years. But we do change in other ways, such as in our social attitudes.

Page 492

The first two weeks of prenatal development is the period of the _____________. The period of the _____________ lasts from 9 weeks after conception until birth. The time between those two prenatal periods is considered the period of the _____________.

nswer: zygote; fetus; embryo

Your friend’s older sister—a regular drinker—hopes to become pregnant soon and has stopped drinking. Why is this a good idea? What negative effects might alcohol consumed during pregnancy have on a developing fetus?

nswer: There is no known safe amount of alcohol during pregnancy, so your iend’s older sister is wise to quit drinking before becoming pregnant. Harmful ffects may occur even before a woman knows she is pregnant. If a woman drinks ersistently and heavily during her pregnancy, the fetus will be at risk for severe hysical and cognitive impairments (such as occurs with fetal alcohol syndrome).

Infants’ _____________ to repeated stimulation helps developmental psychologists study what they can learn and remember.

nswer: habituation

Module 46 Infancy and Childhood: Physical Development

Page 496

What is the biological growth process that explains why most children begin walking by about 12 to 15 months?

nswer: maturation

Module 47 Infancy and Childhood: Cognitive Development

Page 504

Match the correct cognitive developmental stage (a–d) to each developmental phenomenon (1–6).

a. Sensorimotor **1. Thinking about abstract concepts, such as “freedom.”**

b. Preoperational **2. Enjoying imaginary play (such as**

	dress-up).
c. Concrete operational	**3. Understanding that physical properties stay the same even when objects change form.**
d. Formal operational	**4. Having the ability to reverse math operations.**
	5. Understanding that something is not gone for good when it disappears from sight, as when Mom “disappears” behind the shower curtain.
	6. Having difficulty taking another’s point of view (as when blocking someone’s view of the TV).

nswer: 1, d; 2, b; 3, c; 4, c; 5, a; 6, b

Page 507

Use Piaget’s first three stages of cognitive development to explain why children are not just miniature adults in the way they think.

nswer: Infants in the sensorimotor stage tend to be focused only on their own erceptions of the world and may, for example, be unaware that objects continue to xist when unseen. A preoperational child is still egocentric and incapable of ppreciating simple logic, such as the reversibility of operations. A preteen in the oncrete operational stage is beginning to think logically about concrete events but ot about abstract concepts.

What does *theory of mind* have to do with autism spectrum disorder?

nswer: Theory of mind focuses on our ability to understand our own and others’ ental states. Those with autism spectrum disorder struggle with this ability.

Module 48 Infancy and Childhood: Social Development

Page 516

The four parenting styles may be described as “too hard, too soft, too uncaring, and just right.” Which parenting style goes with each of these descriptions, and how do children benefit from the “just right” style?

nswer: The authoritarian style would be described as too hard, the permissive tyle too soft, the negligent style too uncaring, and the authoritative style just right. arents using the authoritative style tend to have children with high self-esteem, elf-reliance, self-regulation, and social competence.

Page 518

What distinguishes imprinting from attachment?

nswer: Attachment is the normal process by which we form emotional ties with nportant others. Imprinting occurs only in certain animals that have a critical eriod very early in their development during which they must form their ttachments, and they do so in an inflexible manner.

Module 49 Gender Development

Page 524

______________ (Men/Women) are more likely to commit relational aggression, and ______________ (men/women) are more likely to commit physical aggression.

nswer: Women; men

Page 527

What are gender roles, and what do their variations tell us about our human capacity for learning and adaptation?

nswer: *Gender roles* are social rules or norms for accepted and expected female nd male behaviors. The norms associated with various roles, including gender les, vary widely in different cultural contexts, which is proof that we are able to earn and adapt to the social demands of different environments.

Module 50 Parents, Peers, and Early Experiences

Page 532

To predict whether a teenager smokes, ask how many of the teen’s friends smoke. One explanation for this correlation is peer influence. What’s another?

nswer: There may also be a *selection effect.* Adolescents tend to select similar thers and sort themselves into like-minded groups. Those who smoke may seek out ther teenagers who also smoke.

Module 51 Adolescence: Physical and Cognitive Development

Page 537

According to Kohlberg, _____________ morality focuses on self-interest, _____________ morality focuses on self-defined ethical principles, and _____________ morality focuses on upholding laws and social rules.

nswer: preconventional; postconventional; conventional

How has Kohlberg’s theory of moral reasoning been criticized?

nswer: Kohlberg’s work reflected an individualist worldview, so his theory is less ulturally universal than he supposed.

Module 52 Adolescence: Social Development and Emerging Adulthood

Page 543

How has the transition from childhood to adulthood changed in Western cultures in the last century or so?

nswer: In little more than a century, the gap between puberty and adult ndependence has widened from about 7 years to about 14 years. This longer dolescence gives us a chance to grow up a bit more before facing the “real world,” ut it also comes with its share of stressors, as sexually mature teens must wait many ears before achieving true independence. In Western nations, this has led to a ostadolescent, not-yet-settled phase of life known as *emerging adulthood.*

Match the psychosocial development stage (1–8) with the issue that Erikson believed we wrestle with at that stage (a–h).

1. Infancy	**a. Generativity vs. stagnation**

2. Toddlerhood

3. Preschool

4. Elementary school

5. Adolescence

6. Young adulthood

7. Middle adulthood

8. Late adulthood

b. Integrity vs. despair

c. Initiative vs. guilt

d. Intimacy vs. isolation

e. Identity vs. role confusion

f. Competence vs. inferiority

g. Trust vs. mistrust

h. Autonomy vs. shame and doubt

nswer: 1, g; 2, h; 3, c; 4, f; 5, e; 6, d; 7, a; 8, b

Module 53 Sexual Development

Page 549

Prenatal sexual development begins about _____________ weeks after conception. Adolescence is marked by the onset of _____________.

nswer: seven; puberty

From a biological perspective, HIV is passed more readily from women to men than from men to women. True or false?

nswer: False. HIV is transmitted more easily and more often from men to women.

Which THREE of the following five factors contribute to unplanned teen pregnancies?

a. Alcohol use
b. Higher intelligence level
c. Father absence
d. Mass media models
e. Participating in service learning programs

nswer: a, c, d

Page 556

Which THREE of the following five factors have researchers found to have an effect on sexual orientation?

a. A domineering mother
b. The size of a certain cell cluster in the hypothalamus
c. Prenatal hormone exposure
d. A distant or ineffectual father
e. For right-handed men, having multiple older biological brothers

nswer: b, c, e

Module 54 Adulthood: Physical, Cognitive, and Social Development

Page 569

Freud defined the healthy adult as one who is able to _____________ and to _____________.

nswer: love; work

What are some of the most significant challenges and rewards of growing old?

nswer: Challenges: decline of muscular strength, reaction times, stamina, sensory eenness, cardiac output, and immune system functioning. Risk of cognitive decline ncreases. Rewards: positive feelings tend to grow; negative emotions are less ntense; and anger, stress, worry, and social-relationship problems decrease.

Research has shown that living together before marriage predicts an increased likelihood of future divorce. What are some possible explanations for this correlation?

nswer: First, those who choose to live together are often less committed to the nduring marriage ideal. Second, they may become even less supportive of this ideal hile cohabiting. Third, people may be more reluctant to break up with a cohabiting artner than a dating partner, despite suspecting that the relationship is nsustainable.

Unit X

Personality

Module 55 Psychoanalytic and Psychodynamic Theories

Page 582

According to Freud's ideas about the three-part personality structure, the _____________ operates on the *reality principle* and tries to balance demands in a way that produces long-term pleasure rather than pain, the _____________ operates on the *pleasure principle* and seeks immediate gratification, and the _____________ represents the voice of our internalized ideals (our *conscience*).

nswer: ego; id; superego

In the psychoanalytic view, conflicts unresolved during one of the psychosexual stages may lead to _____________ at that stage.

nswer: fixation

Freud believed that our defense mechanisms operate _____________ (consciously/unconsciously) and defend us against _____________.

nswer: unconsciously; anxiety

Page 588

What are three big ideas that have survived from Freud's psychoanalytic theory? What are three ways in which Freud's theory has been criticized?

nswer: Freud is credited with first drawing attention to (1) the importance of
hildhood experiences, (2) the existence of the unconscious mind, and (3) our self-
rotective defense mechanisms. Freud's theory has been criticized as (1) not
cientifically testable and offering after-the-fact explanations, (2) focusing too much
n sexual conflicts in childhood, and (3) being based on the idea of repression,
hich has not been supported by modern research.

Which elements of traditional psychoanalysis have modern-day psychodynamic theorists and therapists retained, and which elements have they mostly left behind?

nswer: Today's psychodynamic theorists and therapists still rely on the
nterviewing techniques that Freud used, and they still tend to focus on childhood

xperiences and attachments, unresolved conflicts, and unconscious influences. owever, they are not likely to dwell on fixation at any psychosexual stage, or the ea that sexual issues are the basis of our personality.

Module 56 Humanistic Theories

Page 594

How did humanistic psychology provide a fresh perspective?

nswer: The humanistic theories sought to turn psychology’s attention away from rives and conflicts and toward our growth potential. This movement’s focus on the ay people strive for self-determination and self-realization was in contrast to reudian theory and strict behaviorism.

What does it mean to be empathic? How about self-actualized? Which humanistic psychologists used these terms?

nswer: To be *empathic* is to share and mirror another person’s feelings. Carl ogers believed that people nurture growth in others by being empathic. Abraham aslow proposed that *self-actualization* is the motivation to fulfill one’s potential, nd one of the ultimate psychological needs (the other is self-transcendence).

Module 57 Trait Theories

Page 601

Which two primary dimensions did Hans Eysenck and Sybil Eysenck propose for describing personality variation?

nswer: introversion–extraversion and emotional stability–instability

What are the Big Five personality factors, and why are they scientifically useful?

nswer: The Big Five personality factors are *c*onscientiousness, *a*greeableness, euroticism (emotional stability vs. instability), *o*penness, and *e*xtraversion: ANOE. These factors may be objectively measured, they are relatively stable over e life span, and they apply to all cultures in which they have been studied.

Page 604

How well do personality test scores predict our behavior? Explain.

nswer: Our scores on personality tests predict our *average* behavior across many ituations much better than they predict our specific behavior in any given situation.

Module 58 Social-Cognitive Theories

Page 609

Albert Bandura proposed the _____________-_____________ perspective on personality, which emphasizes the interaction of people with their environment. To describe the interacting influences of behavior, thoughts, and environment, he used the term _____________ _____________.

nswer: social-cognitive; reciprocal determinism

What is the best way to predict a person's future behavior?

nswer: Examine the person's past behavior patterns in similar situations.

Module 59 Exploring the Self

Page 616

What are the positive and negative effects of high self-esteem?

nswer: People who feel confident in their abilities are often happier, have greater otivation, and are less susceptible to depression. Inflated self-esteem can lead to elf-serving bias, greater aggression, and narcissism.

The tendency to accept responsibility for success and blame circumstances or bad luck for failure is called _____________ – _____________ _____________ .

nswer: self-serving bias

_____________ (Secure/Defensive) self-esteem is linked to angry and aggressive behavior. _____________ (Secure/Defensive) self-esteem is a healthier self-image that allows us to focus beyond ourselves and enjoy a higher quality of life.

nswer: Defensive; Secure

Page 618

How do people in individualist and collectivist cultures differ?

nswer: Individualists give priority to personal goals over group goals and tend to efine their identity in terms of their own personal attributes. Collectivists give riority to group goals over individual goals and tend to define their identity in terms f group identifications.

Unit XI

Testing and Individual Differences

Module 60 Introduction to Intelligence

Page 630

How does the existence of savant syndrome support Gardner’s theory of multiple intelligences?

nswer: People with savant syndrome have limited mental ability overall but ossess one or more exceptional skills. According to Howard Gardner, this suggests at our abilities come in separate packages rather than being fully expressed by one eneral intelligence that encompasses all our talents.

Joseph, a Harvard Law School student, has a straight-A average, writes for the *Harvard Law Review,* and will clerk for a Supreme Court justice next year. His grandmother, Judith, is very proud of him, saying he is far more intelligent than she ever was. But Joseph is also very proud of Judith: As a young woman, she was imprisoned by the Nazis. When the war ended, she walked out of Germany, contacted an agency helping refugees, and began a new life in the United States as an assistant chef in her cousin’s restaurant. According to the definition of intelligence in this unit, is Joseph the only intelligent person in this story? Why or why not?

nswer: Joseph is not the only intelligent person in this story. Intelligence is the bility to learn from experience, solve problems, and use knowledge to adapt to new tuations. Judith certainly demonstrates this quality as well, given all that she has ccomplished.

Module 61 Assessing Intelligence

Page 634

What did Binet hope to achieve by establishing a child's mental age?

nswer: Binet hoped that determining the child's mental age (the age that typically orresponds to a certain level of performance) would help identify appropriate chool placements.

What is the IQ of a 4-year-old with a mental age of 5?

nswer: 125 (5 ÷ 4 × 100 = 125)

Page 638

An employer with a pool of applicants for a single available position is interested in testing each applicant's potential. To determine that, she should use an _____________ (achievement/aptitude) test. That same employer wishing to test the effectiveness of a new, on-the-job training program would be wise to use an _____________ (achievement/aptitude) test.

nswer: aptitude; achievement

What are the three criteria that a psychological test must meet in order to be widely accepted? Explain.

nswer: A psychological test must be *standardized* (pretested on a representative ample of people), *reliable* (yielding consistent results), and *valid* (measuring and redicting what it is supposed to).

Correlation coefficients were used in this section. Here's a quick review: Correlations do not indicate cause-effect, but they do tell us whether two things are associated in some way. A correlation of -1.00 represents perfect _____________ (agreement/disagreement) between two sets of scores: As one score goes up, the other score goes _____________ (up/down). A correlation of _____________ represents no association. The highest correlation, +1.00, represents perfect _____________ (agreement/disagreement): As the first score goes up, the other score goes _____________ (up/down).

nswer: disagreement; down; zero; agreement; up

Module 62 The Dynamics of Intelligence

Page 645

Researcher A is well-funded to learn about how intelligence changes over the life span. Researcher B wants to study the intelligence of people who are now at various life stages. Which researcher should use the cross-sectional method, and which the longitudinal method?

nswer: Researcher A should develop a *longitudinal study* to examine how
telligence changes in the same people over the life span. Researcher B should
evelop a *cross-sectional study* to examine the intelligence of people now at various
fe stages.

Why do psychologists not diagnose an intellectual disability based solely on a person's intelligence test score?

nswer: An intelligence test score is only one measure of a person's ability to
nction. Other important factors to consider in an overall assessment include
onceptual skills, social skills, and practical skills.

The Smiths have enrolled their 2-year-old son in a special program that promises to assess his IQ and, if he places in the top 5 percent of test-takers, to create a plan that will guarantee his admission to a top university at age 18. Why is this endeavor of questionable value?

nswer: First, IQ tests given before age 3 are only modestly reliable predictors of
dult intelligence. Second, admission to a top university depends on more than
imple IQ. Third, there are no known training programs that could guarantee this
esult.

Module 63 Studying Genetic and Environmental Influences on Intelligence

Page 651

A check on your understanding of heritability: If environments become more equal, the heritability of intelligence will

a. increase.

b. decrease.

c. be unchanged.

nswer: a. (Heritability—variation explained by genetic influences—will increase s environmental variation decreases.)

Module 64 Group Differences and the Question of Bias

Page 659

What psychological principle helps explain why women tend to perform more poorly when they believe their online chess opponent is male?

nswer: stereotype threat

What is the difference between a test that is biased culturally, and a test that is biased in terms of its validity?

nswer: A test may be *culturally* biased if higher scores are achieved by those with ertain cultural experiences. That same test may not be biased in terms of *validity* if predicts what it is supposed to predict. For example, the SAT may be culturally iased in favor of those with experience in the U.S. school system, but it does still ccurately predict U.S. college success.

Unit XII

Abnormal Behavior

Module 65 Introduction to Psychological Disorders

Page 672

A lawyer is distressed by feeling the need to wash his hands 100 times a day. He has little time to meet with clients, and his colleagues are wondering about his competence. His behavior would probably be labeled disordered, because it is ______________—that is, it interferes with his day-to-day life.

nswer: dysfunctional or maladaptive

Are psychological disorders universal or culture-specific? Explain with examples.

nswer: Some psychological disorders are culture-specific. For example, anorexia ervosa occurs mostly in Western cultures, and *taijin-kyofusho* appears largely in apan. Other disorders, such as schizophrenia, are universal—they occur in all ultures.

What is the value, and what are the dangers, of labeling individuals with disorders?

nswer: Therapists and others apply disorder labels to communicate with one nother using a common language, and to share concepts during research. Clients nay benefit from knowing that they are not the only ones with these symptoms. The angers of labeling people are that (1) people may begin to act as they have been ıbeled, and (2) the labels can trigger assumptions that will change people’s ehavior toward those labeled.

Page 675

What is the biopsychosocial approach, and why is it important in our understanding of psychological disorders?

nswer: Biological, psychological, and social-cultural influences combine to roduce psychological disorders. This approach helps us understand that our well-eing is affected by our genes, brain functioning, inner thoughts and feelings, and ıe influences of our social and cultural environments.

What is the relationship between poverty and psychological disorders?

nswer: Poverty-related stresses can help trigger disorders, but disabling disorders an also contribute to poverty. Thus, poverty and disorder are often a chicken-and-gg situation; it’s hard to know which came first.

Module 66 Anxiety Disorders, Obsessive-Compulsive Disorder, and Posttraumatic Stress Disorder

Page 679

Unfocused tension, apprehension, and arousal are symptoms of ______________ ______________ disorder.

nswer: generalized anxiety

Those who experience unpredictable periods of terror and intense dread, accompanied by frightening physical sensations, may be diagnosed with a _____________ disorder.

Answer: panic

If a person is focusing anxiety on specific feared objects or situations, that person may have a _____________.

Answer: phobia

Page 681

Those who express anxiety through unwanted repetitive thoughts or actions may have a(n) _____________-_____________ disorder.

Answer: obsessive-compulsive

Those with symptoms of recurring memories and nightmares, social withdrawal, jumpy anxiety, numbness of feeling, and/or insomnia for weeks after a traumatic event may be diagnosed with _____________ _____________ disorder.

Answer: posttraumatic stress

Page 684

Researchers believe that conditioning and cognitive processes contribute to anxiety-related disorders. What *biological* factors also contribute to these disorders?

Answer: Biological factors include inherited temperament differences and other ene variations; experience-altered brain pathways; and inherited responses that had urvival value for our distant ancestors.

Module 67 Depressive Disorders, Bipolar Disorder, Suicide, and Self-Injury

Page 697

What does it mean to say that “depression is a whole-body disorder”?

Answer: Many factors contribute to depression, including the biological influences f genetics and brain function. Social-cognitive factors also matter, including the teraction of explanatory style, mood, our responses to stressful experiences, and hanges in our patterns of thinking and behaving. Depression involves the whole ody and may disrupt sleep, energy, and concentration.

Module 68 Schizophrenia

Page 704

A person with schizophrenia who has _____________ (positive/negative) symptoms may have an expressionless face and toneless voice. These symptoms are most common with _____________ (chronic/acute) schizophrenia and are not likely to respond to drug therapy. Those with _____________ (positive/negative) symptoms are likely to experience delusions, and, if the symptoms have arisen suddenly, to be diagnosed with _____________ (chronic/acute) schizophrenia, which is much more likely to respond to drug therapy.

nswer: negative; chronic; positive; acute

What factors contribute to the onset and development of schizophrenia?

nswer: Biological factors include abnormalities in brain structure and function and genetic predisposition to the disorder. Environmental factors such as nutritional eprivation, exposure to virus, and maternal stress contribute by activating the genes at increase risk. Exposure to many environmental triggers can increase the odds of eveloping schizophrenia.

Module 69 Other Disorders

Page 708

What does *somatic* mean, and how does it apply to *somatic symptom disorders*?

nswer: Somatic symptoms are bodily symptoms. A somatic disorder is one in hich symptoms take a somatic (bodily) form without apparent physical cause.

Page 710

The psychodynamic and learning perspectives agree that dissociative identity disorder symptoms are ways of dealing with anxiety. How do their

explanations differ?

nswer: The psychodynamic explanation of DID symptoms is that they are efenses against anxiety generated by unacceptable urges. The learning perspective ttempts to explain these symptoms as behaviors that have been reinforced by elieving anxiety.

Page 714

How do biological and psychological factors contribute to antisocial personality disorder?

nswer: Twin and adoption studies show that biological relatives of people with is disorder are at increased risk for antisocial behavior. Researchers have also bserved differences in the brain activity and structure of antisocial criminals. egative environmental factors, such as poverty or childhood abuse, may channel enetic traits such as fearlessness in more dangerous directions—toward aggression nd away from social responsibility.

People with ______________ ______________ (anorexia nervosa/bulimia nervosa) continue to want to lose weight even when they are underweight. Those with ______________ ______________ (anorexia nervosa/bulimia nervosa) tend to have weight that fluctuates within or above normal ranges.

nswer: anorexia nervosa; bulimia nervosa

Unit XIII

Treatment of Abnormal Behavior

Module 70 Introduction to Therapy, and Psychodynamic and Humanistic Therapies

Page 727

In psychoanalysis, when patients experience strong feelings for their therapist, this is called ______________. Patients are said to demonstrate anxiety when they put up mental blocks around sensitive memories, indicating ______________. The therapist will attempt to provide insight into the

underlying anxiety by offering a(n) _____________ of the mental blocks.

nswer: transference; resistance; interpretation

Module 71 Behavior, Cognitive, and Group Therapies

Page 733

What might a psychodynamic therapist say about Mowrer’s therapy for bed-wetting? How might a behavior therapist defend it?

nswer: A psychodynamic therapist might be more interested in helping the child evelop insight about the underlying problems that have caused the bed-wetting esponse. A behavior therapist would be more likely to agree with Mowrer that the ed-wetting symptom *is* the problem, and that counterconditioning the unwanted ehavior would indeed bring emotional relief.

Some maladaptive behaviors are learned. What hope does this fact provide?

nswer: If a behavior can be learned, it can be *un*learned, and replaced by other ore adaptive responses.

Exposure therapies and aversive conditioning are applications of _____________ conditioning. Token economies are an application of _____________ conditioning.

nswer: classical; operant

Page 739

How do the humanistic and cognitive therapies differ?

nswer: By reflecting clients’ feelings in a nondirective setting, the *humanistic erapies* attempt to foster personal growth by helping clients become more self-ware and self-accepting. By making clients aware of self-defeating patterns of inking, *cognitive therapies* guide people toward more adaptive ways of thinking bout themselves and their world.

A critical attribute of _____________ _____________, developed by Aaron Beck, focuses on the belief that changing people’s thinking can change their functioning.

nswer: cognitive therapy

What is cognitive-behavioral therapy, and what sorts of problems does this therapy best address?

nswer: This integrative therapy helps people change self-defeating thinking and ehavior. It has been shown to be effective for those with anxiety disorders, bsessive-compulsive disorder, depressive disorders, bipolar disorder, and eating isorders.

Module 72 Evaluating Psychotherapies

Page 745

How might the *placebo effect* bias clients' and clinicians' appraisals of the effectiveness of psychotherapies?

nswer: The *placebo effect* is the healing power of *belief* in a treatment. Patients nd therapists who expect a treatment to be effective may believe it was.

Therapy is most likely to be helpful for those with problems that _____________ (are/are not) well-defined.

nswer: are

What is *evidence-based practice?*

nswer: Using this approach, therapists make decisions about treatment based on search evidence, clinical expertise, and knowledge of the client.

Page 749

Those who undergo psychotherapy are _____________ (more/less) likely to show improvement than those who do not undergo psychotherapy.

nswer: more

What does the evidence suggest about the efficacy of EMDR and light therapy?

nswer: light therapy

Module 73 The Biomedical Therapies and Preventing Psychological Disorders

Page 752

What are some examples of lifestyle changes we can make to enhance our mental health?

nswer: Exercise regularly, get enough sleep, get more exposure to light (get utside or use a light box), nurture important relationships, redirect negative inking, and eat a diet rich in omega-3 fatty acids.

Page 759

How do researchers determine if particular drug therapies are effective?

nswer: Researchers assign people to treatment and no-treatment conditions to see those who receive the drug therapy improve more than those who don’t. Double-lind controlled studies are most effective. If neither the therapist nor the client nows which participants have received the drug treatment, then any difference etween the treated and untreated groups will reflect the drug treatment’s actual ffect.

The drugs given most often to treat depression are called _____________. Schizophrenia is often treated with _____________ drugs.

nswer: antidepressants; antipsychotic

Page 761

Severe depression that has not responded to other therapy may be treated with _____________ _____________, which can cause brain seizures and memory loss. More moderate neural stimulation techniques designed to help alleviate depression include _____________ direct current stimulation, _____________ _____________ magnetic stimulation, and _____________-_____________ stimulation.

nswer: electroconvulsive therapy (ECT); repetitive transcranial; deep-brain

What is the difference between preventive mental health and the psychological and biomedical therapies?

nswer: Psychological and biomedical therapies attempt to relieve people’s ffering from psychological disorders. Preventive mental health attempts to prevent ffering by identifying and eliminating the conditions that cause disorders.

Unit XIV

Social Psychology

Module 74 Attribution, Attitudes, and Actions

Page 773

Driving to school one snowy day, Marco narrowly misses a car that slides through a red light. “Slow down! What a terrible driver,” he thinks to himself. Moments later, Marco himself slips through an intersection and yelps, “Wow! These roads are awful. The city plows need to get out here.” What social psychology principle has Marco just demonstrated? Explain.

nswer: By attributing the other person’s behavior to the person (“he’s a terrible river”) and his own to the situation (“these roads are awful”), Marco has exhibited e *fundamental attribution error.*

How do our attitudes and our actions affect each other?

nswer: Our attitudes often influence our actions as we behave in ways consistent ith our beliefs. However, our actions also influence our attitudes; we come to elieve in what we have done.

When people act in a way that is not in keeping with their attitudes, and then change their attitudes to match those actions, _____________ _____________ theory attempts to explain why.

nswer: cognitive dissonance

Module 75 Conformity and Obedience

Page 782

Despite her mother’s pleas to use a more ergonomic backpack, Antonia insists on trying to carry all of her books to school in an oversized purse the way her

fashionable friends all seem to do. Antonia is affected by what type of social influence?

nswer: normative social influence

Psychology’s most famous obedience experiments, in which most participants obeyed an authority figure’s demands to inflict presumed painful, dangerous shocks on an innocent participant, were conducted by social psychologist ______________ ______________.

nswer: Stanley Milgram

What types of situations have researchers found to be most likely to encourage obedience in participants?

nswer: The Milgram studies showed that people were most likely to follow orders hen the experimenter was nearby and was a legitimate authority figure, the victim as not nearby, and there were no models for defiance.

Module 76 Group Behavior

Page 786

What is social facilitation, and why is it more likely to occur with a well-learned task?

nswer: This improved performance in the presence of others is most likely to ccur with a well-learned task, because the added arousal caused by an audience nds to strengthen the most likely response. This also predicts poorer performance n a difficult task in others’ presence.

People tend to exert less effort when working with a group than they would alone, which is called ______________ ______________.

nswer: social loafing

You are organizing a meeting of fiercely competitive political candidates. To add to the fun, friends have suggested handing out masks of the candidates’ faces for supporters to wear. What phenomenon might these masks engage?

nswer: The anonymity provided by the masks, combined with the arousal of the ontentious setting, might create deindividuation (lessened self-awareness and self-straint).

Page 790

When like-minded groups discuss a topic, and the result is the strengthening of the prevailing opinion, this is called ______________ ______________.

nswer: group polarization

When a group's desire for harmony overrides its realistic analysis of other options, ______________ has occurred.

nswer: groupthink

Module 77 Prejudice and Discrimination

Page 799

What is the difference between prejudice and discrimination?

nswer: Prejudice is an unjustifiable and usually negative *attitude* toward a group nd its members, while unjustifiable negative *behavior* is discrimination.

When prejudiced judgment causes us to blame an undeserving person for a problem, that person is called a ______________.

nswer: scapegoat

Module 78 Aggression

Page 806

What psychological, biological, and social-cultural influences interact to produce aggressive behaviors?

nswer: Our biology (our genes, neural systems, and biochemistry—including stosterone and alcohol levels) influences our aggressive tendencies. Psychological ctors (such as frustration, previous rewards for aggressive acts, and observation of thers' aggression) can trigger any aggressive tendencies we may have. Social fluences, such as exposure to violent media or being ostracized from a group, and ultural influences, such as whether we've grown up in a "culture of honor" or a ther-absent home, can also affect our aggressive responses.

Module 79 Attraction

Page 812

People tend to marry someone who lives or works nearby. This is an example of the _____________ _____________ _____________ in action.

nswer: mere exposure effect

How does being physically attractive influence others’ perceptions?

nswer: Being physically attractive tends to elicit positive first impressions. People nd to assume that attractive people are healthier, happier, and more socially skilled an others are.

Page 814

How does the two-factor theory of emotion help explain *passionate love?*

nswer: Emotions consist of (1) physical arousal and (2) our interpretation of that rousal. Researchers have found that any source of arousal (running, fear, laughter) ay be interpreted as passion in the presence of a desirable person.

Two vital components for maintaining companionate love are _____________ and _____________-_____________.

nswer: equity; self-disclosure

Module 80 Altruism, Conflict, and Peacemaking

Page 818

Why didn’t anybody help Kitty Genovese? What social psychology principle did this incident illustrate?

nswer: In the presence of others, an individual is less likely to notice a situation, orrectly interpret it as an emergency, and take responsibility for offering help. The itty Genovese case demonstrated this *bystander effect*, as each witness assumed any others were also aware of the event.

Page 823

Why do sports fans tend to feel a sense of satisfaction when their archrival team loses? Why do such feelings, in other settings, make conflict resolution

more challenging?

nswer: Sports fans may feel they are part of an *ingroup* that sets itself apart from n *outgroup* (fans of the archrival team). Ingroup bias tends to develop, leading to rejudice and the view that the outgroup “deserves” misfortune. So, the archrival am’s loss may seem justified. In conflicts, this kind of thinking is problematic, specially when each side in the conflict develops *mirror-image perceptions* of the ther (distorted, negative images that are ironically similar).

What are some ways to reconcile conflicts and promote peace?

nswer: Peacemakers should encourage equal-status contact, cooperation to chieve *superordinate goals* (shared goals that override differences), understanding rough communication, and reciprocated conciliatory gestures (each side gives a ttle).

Enrichment Modules

Module 81 Influences on Drug Use

Page 832

Why do tobacco companies try so hard to get customers hooked as teens?

nswer: Nicotine is powerfully addictive, and those who start paving the neural athways when young may find it very hard to stop using it. As a result, tobacco ompanies may have lifelong customers. Moreover, evidence suggests that if igarette manufacturers haven’t hooked customers by early adulthood, they most kely won’t.

Studies have found that people who begin drinking in their early teens are much more likely to develop alcohol use disorder than those who begin at age 21 or after. What possible explanations might there be for this correlation?

nswer: Possible explanations include (a) biological factors (a person could have a iological predisposition to both early use and later abuse, or alcohol use could odify a person’s neural pathways); (b) psychological factors (early use could stablish taste preferences for alcohol); and (c) social-cultural factors (early use ould influence enduring habits, attitudes, activities, or peer relationships that could ster alcohol use disorder).

Module 82 Psychology at Work

Page 839

What is the value of finding flow in our work?

nswer: We become more likely to view our work as fulfilling and socially useful, nd we experience higher self-esteem, competence, and overall well-being.

A human resources director explains to you that “I don’t bother with tests or references. It’s all about the interview.” Based on I/O psychology research, what concerns does this raise?

nswer: (1) Interviewers may presume people are what they seem to be in terviews. (2) Interviewers’ preconceptions and moods color how they perceive terviewees’ responses. (3) Interviewers judge people relative to other recent terviewees. (4) Interviewers tend to track the successful careers of those they hire, ot the successful careers of those they reject. (5) Interviews tend to disclose rospective workers’ good intentions, not their habitual behaviors.

Page 844

What are the two basic types of leadership, and how do the most effective managers employ these leadership strategies?

nswer: Task leadership is goal-oriented. Managers using this style set standards, rganize work, and focus attention on goals. Social leadership is group-oriented. anagers using this style build teamwork, mediate conflict, and offer support. esearch indicates that effective managers exhibit both task and social leadership, epending on the situation and the person.

What characteristics are important for transformational leaders?

nswer: Transformational leaders are able to inspire others to share a vision and ommit themselves to a group’s mission. They tend to be naturally extraverted and t high standards.

Page 846

What is the *curse of knowledge,* and what does it have to do with the work of human factors psychologists?

nswer: To develop safer machines and work environments, human factors
sychologists stay mindful of the curse of knowledge—the tendency for experts to
istakenly assume that others share their knowledge.

Module 83 Animal Thinking and Language

Page 850

If your dog barks at a stranger at the door, does this qualify as language? What if the dog yips in a telltale way to let you know she needs to go out?

nswer: These are definitely communications. But if language consists of words
nd the grammatical rules we use to combine them to communicate meaning, few
cientists would label a dog’s barking and yipping as language.

Glossary

English	Español
A	
absolute threshold the minimum stimulus energy needed to detect a particular stimulus 50 percent of the time. (p. 163)	**umbral absoluto** el mínimo de energía que requiere un estímulo para tener 50 por ciento de probabilidades de ser detectado. (p. 163)
accommodation (1) in sensation and perception, the process by which the eye's lens changes shape to focus near or far objects on the retina. (2) in developmental psychology, adapting our current understandings (schemas) to incorporate new information. (pp. 177, 498)	**acomodación** (1) en sensación y percepción, proceso por el cual la lente del ojo cambia de forma para enfocar objetos cercanos o lejanos en la retina. (2) en psicología del desarrollo, adaptar nuestros entendimientos actuales (esquemas) para incorporar información nueva. (pp. 177, 498)
achievement motivation a desire for significant accomplishment, for mastery of skills or ideas, for control, and for attaining a high standard. (p. 428)	**motivación del logro** deseo de conseguir un logro significante, de dominar habilidades o ideas, de control, y de alcanzar un estándar elevado. (p. 428)
achievement test a test designed to assess what a person has learned. (p. 632)	**prueba de rendimiento** prueba diseñada para evaluar los aprendizajes de una persona. (p. 632)
acquisition in classical conditioning, the initial stage, when one links a neutral stimulus and an unconditioned stimulus so that the neutral stimulus begins triggering the conditioned response. In operant conditioning, the strengthening of a reinforced response. (p. 275)	**adquisición** etapa inicial, en el condicionamiento clásico, donde uno relaciona un estímulo neutral con un estímulo no condicionado de tal manera que el estímulo neutral provoca una respuesta condicionada. En el condicionamiento operante, es el fortalecimiento de una respuesta reforzada.

	(p. 275)
action potential a neural impulse; a brief electrical charge that travels down an axon. (p. 83)	**acción potencial** un impulso neural; una breve carga eléctrica que viaja por un axón. (p. 83)
active listening empathic listening in which the listener echoes, restates, and clarifies. A feature of Rogers’ client-centered therapy. (p. 726)	**escucha activa** forma de escuchar con empatía en la cual, la persona que escucha resuena, reafirma y clarifica las palabras de la otra persona. Es un rasgo de la terapia centrada en el cliente de Carl Rogers. (p. 726)
acute schizophrenia (also called *reactive schizophrenia*) a form of schizophrenia that can begin at any age; frequently occurs in response to a traumatic event. (p. 701)	**esquizofrenia aguda** (también conocida como *esquizofrenia reactiva*) tipo de esquizofrenia que puede comenzar a cualquier edad; con frecuencia ocurre como respuesta a un evento traumático. (p. 701)
adaptation-level phenomenon our tendency to form judgments (of sounds, of lights, of income) relative to a neutral level defined by our prior experience. (p. 476)	**fenómeno del nivel de adaptación** nuestra tendencia a formar juicios (de sonidos, de luces, de ingresos) en relación con un nivel neutral definido por nuestra experiencia previa. (p. 476)
adolescence the transition period from childhood to adulthood, extending from puberty to independence. (p. 533)	**adolescencia** el periodo de transición de la infancia hacia la edad adulta, que se extiende desde la pubertad hasta la independencia. (p. 533)
adrenal [ah-DREEN-el] **glands** a pair of endocrine glands that sit just above the kidneys and secrete hormones (epinephrine and norepinephrine) that help arouse the body in times of stress. (p. 95)	**glándulas suprarrenales** par de glándulas endócrinas, ubicadas en la parte superior de los riñones, que secretan hormonas (epinefrina, también conocida como adrenalina, y norepinefrina, también conocida como noradrenalina) que ayudan a despertar el cuerpo en tiempos de estrés . (p. 95)
aerobic exercise sustained exercise that increases heart and lung fitness; also helps alleviate depression and anxiety. (p. 467)	**ejercicio aeróbico** ejercicio continuo que mejora la condición pulmonar y cardiovascular; también ayuda a aliviar la depresión y ansiedad. (p. 467)
affiliation need the need to build relationships and to feel	**necesidad de afiliación** la necesidad de construir relaciones y

part of a group. (p. 423)	sentirse parte de un grupo. (p. 423)
aggression any physical or verbal behavior intended to harm someone physically or emotionally. (pp. 521, 801)	**agresión** cualquier comportamiento físico o verbal que tiene la intención de lastimar, ya sea emocionalmente o físicamente, a otra persona. (pp. 521, 801)
agonist a molecule that increases a neurotransmitter's action. (p. 88)	**agonista** molécula que incrementa la acción de un neurotransmisor. (p. 88)
agoraphobia fear or avoidance of situations, such as crowds or wide open places, where one has felt loss of control and panic. (p. 678)	**agorafobia** miedo o tendencia a evitar situaciones, como multitudes o espacios abiertos, donde uno siente pérdida de control y pánico. (p. 678)
AIDS (acquired immune deficiency syndrome) a life-threatening, sexually transmitted infection caused by the *human immunodeficiency virus (HIV)*. AIDS depletes the immune system, leaving the person vulnerable to infections. (p. 547)	**SIDA** (síndrome de inmunodeficiencia adquirida) infección mortal de transmisión sexual provocada por el *virus de inmunodeficiencia humana VIH*). El SIDA afecta al sistema inmune y deja a la persona vulnerable a infecciones. (p. 547)
alcohol use disorder (popularly known as *alcoholism*) alcohol use marked by tolerance, withdrawal, and a drive to continue problematic use. (p. 255)	**trastorno de abuso de alcohol** (conocido popularmente como *alcoholismo*) consumo de alcohol marcado por la tolerancia, retraimiento y el impulso de continuar con el uso problemático. (p. 255)
algorithm a methodical, logical rule or procedure that guarantees solving a particular problem. Contrasts with the usually speedier—but also more error-prone—use of *heuristics*. (p. 370)	**algoritmo** regla o procedimiento metódico y lógico que garantiza la resolución de un problema particular. Contrasta con el uso de la heurística que es más veloz pero también más propensa a los errores. (p. 370)
all-or-none response a neuron's reaction of either firing (with a full-strength response) or not firing. (p. 83)	**respuesta de todo o nada** la reacción de una neurona que dispara (con una respuesta total) o no dispara. (p. 83)
alpha waves the relatively slow brain waves of a relaxed, awake state. (p. 232)	**ondas alfa** las ondas cerebrales relativamente lentas del estado despierto y relajado. (p. 232)
altruism	**altruismo**

unselfish regard for the welfare of others. (p. 816)	consideración generosa por el bienestar de otros (p. 816)
Alzheimer’s disease a neurocognitive disorder marked by neural plaques, often with onset after age 80, and entailing a progressive decline in memory and other cognitive abilities. (p. 563)	**enfermedad de Alzheimer** trastorno neurocognitivo marcado por la aparición de placas seniles, que generalmente inicia después de los 80 años y conlleva un declive progresivo en la memoria y otras habilidades cognitivas. (p. 563)
amphetamines drugs, such as methamphetamine, that stimulate neural activity, causing accelerated body functions and associated energy and mood changes. (p. 260)	**anfetaminas** sustancias, como la metanfetamina, que estimula la actividad neural y provoca una aceleración en las funciones corporales y que está asociada con cambios en los niveles de energía y en el estado del humor. (p. 260)
amygdala [uh-MIG-duh-la] two lima-bean-sized neural clusters in the limbic system; linked to emotion. (p. 104)	**amígdalas** dos cúmulos neurales del tamaño de una haba que forman parte del sistema límbico; están vinculadas a las emociones. (p. 104)
androgyny displaying both traditional masculine and feminine psychological characteristics. (p. 526)	**androginia** cuando una persona muestra rasgos psicológicos tradicionales tanto masculinos como femeninos. (p. 526)
anorexia nervosa an eating disorder in which a person (usually an adolescent female) maintains a starvation diet despite being significantly underweight; sometimes accompanied by excessive exercise. (p. 712)	**anorexia nerviosa** trastorno alimenticio en el cual una persona (normalmente mujer adolescente) mantiene una dieta de hambre a pesar de tener el peso significativamente por debajo de lo normal; a veces también conlleva ejercicio en exceso. (p. 712)
antagonist a molecule that inhibits or blocks a neurotransmitter’s action. (p. 89)	**antagonista** molécula que inhibe la acción de un neurotransmisor. (p. 89)
anterograde amnesia an inability to form new memories. (p. 351)	**amnesia anterógrada** la incapacidad de formar nuevas memorias. (p. 351)
antianxiety drugs drugs used to control anxiety and agitation. (p. 754)	**ansiolíticos** medicamentos para controlar la ansiedad y la agitación. (p. 754)

antidepressant drugs drugs used to treat depression, anxiety disorders, obsessive-compulsive disorder, and posttraumatic stress disorder. (Several widely used antidepressant drugs are *selective serotonin reuptake inhibitors—SSRIs*.) (p. 754)	**antidepresivos** medicamentos para tratar depresión, trastornos de ansiedad, trastornos obsesivo-compulsivos y el trastorno por estrés postraumático. (Varios de los antidepresivos comunes son inhibidores selectivos de la recaptación de serotonina—ISRS.) (p. 754)
antipsychotic drugs drugs used to treat schizophrenia and other forms of severe thought disorder. (p. 753)	**medicamentos antipsicóticos** medicamentos que se usan para tratar la esquizofrenia y otros tipos de trastorno severo del pensamiento. (p. 753)
antisocial personality disorder a personality disorder in which a person (usually a man) exhibits a lack of conscience for wrongdoing, even toward friends and family members; may be aggressive and ruthless or a clever con artist. (p. 710)	**trastorno de la personalidad antisocial** trastorno de la personalidad en el cual una persona (normalmente hombre) no está consciente de haber causado un mal, incluso hacia amigos o familiares puede ser agresivo, despiadado o incluso puede llegar a ser un astuto estafador. (p. 710)
anxiety disorders psychological disorders characterized by distressing, persistent anxiety or maladaptive behaviors that reduce anxiety. (p. 677)	**trastornos de ansiedad** trastornos psicológicos caracterizados por estados de angustia, ansiedad persistente o que muestran una conducta inadaptada que reduce la ansiedad. (p. 677)
aphasia impairment of language, usually caused by left hemisphere damage either to Broca's area (impairing speaking) or to Wernicke's area (impairing understanding). (p. 387)	**afasia** discapacidad del lenguaje, generalmente provocado por daños en el hemisferio izquierdo del cerebro, ya sea en el área de Broca (que afecta al habla) o al área de Wernicke (que afecta la comprensión). (p. 387)
applied research scientific study that aims to solve practical problems. (p. 24)	**investigación aplicada** estudios científicos que buscan resolver problemas prácticos. (p. 24)
aptitude test a test designed to predict a person's future performance; *aptitude* is the capacity to learn. (p. 632)	**prueba de aptitud** prueba diseñada para predecir el desempeño futuro de una persona; aptitud capacidad para aprender. (p. 632)
asexual having no sexual attraction to others. (p. 418)	**asexual** que no siente atracción sexual hacia otros. (p. 418)

assimilation interpreting our new experiences in terms of our existing schemas. (p. 498)	**asimilación** interpretar nuestras nuevas experiencias según nuestros esquemas existentes (p. 498)
association areas areas of the cerebral cortex that are not involved in primary motor or sensory functions; rather, they are involved in higher mental functions such as learning, remembering, thinking, and speaking. (p. 114)	**áreas de asociación** áreas de la corteza cerebral que no se involucran en las funciones primarias motrices o sensoriales; en vez de eso, se involucran en funciones mentales superiores como el aprender, recordar, pensar y hablar. (p. 114)
associative learning learning that certain events occur together. The events may be two stimuli (as in classical conditioning) or a response and its consequence (as in operant conditioning). (p. 271)	**aprendizaje asociativo** aprender que ciertos sucesos ocurren juntos. Los sucesos pueden ser dos estímulos (como en el condicionamiento clásico) o una respuesta y su consecuencia (como en el condicionamiento operativo). (p. 271)
attachment an emotional tie with another person; shown in young children by their seeking closeness to their caregiver and showing distress on separation. (p. 509)	**apego** conexión emocional con otra persona; la muestran los niños pequeños al buscar cercanía con sus cuidadores y aflicción al separse de ellos. (p. 509)
attention-deficit/hyperactivity disorder (ADHD) a psychological disorder marked by extreme inattention and/or hyperactivity and impulsivity. (p. 670)	**trastorno por déficit de atención con hiperactividad (TDAH)** trastorno psicológico marcado por una falta de atención extrema y/o hiperactividad e impulsividad. (p. 670)
attitude feelings, often influenced by our beliefs, that predispose us to respond in a particular way to objects, people, and events. (p. 770)	**actitud** sentimientos, muchas veces influenciados por nuestras creencias, que nos predisponen a responder de una manera especial a los objetos, la gente y los sucesos. (p. 770)
attribution theory the theory that we explain someone's behavior by crediting either the situation or the person's disposition. (p. 768)	**teoría de atribución** teoría según la cual el comportamiento de alguien se atribuye a una situación o a la disposición de aquella persona. (p. 768)
audition the sense or act of hearing. (p. 198)	**audición** sentido o acto de oír. (p. 198)
autism spectrum disorder (ASD) a disorder that appears in childhood and is	**trastorno del espectro autista (ASD, en inglés)**

marked by significant deficiencies in communication and social interaction, and by rigidly fixated interests and repetitive behaviors. (p. 505)	trastorno que aparece en la infancia, marcado por deficiencias significativas de comunicación e interacción social, y por una fijación rígida en sus intereses y comportamientos repetitivos. (p. 505)
automatic processing unconscious encoding of incidental information, such as space, time, and frequency, and of well-learned information, such as word meanings. (p. 331)	**procesamiento automático** codificación inconsciente de información incidental, como espacio, tiempo y frecuencia, y de información bien aprendida, como los significados de palabras. (p. 331)
autonomic [aw-tuh-NAHM-ik] **nervous system (ANS)** the part of the peripheral nervous system that controls the glands and the muscles of the internal organs (such as the heart). Its sympathetic division arouses; its parasympathetic division calms. (p. 93)	**sistema nervioso autónomo (ANS, en inglés)** la parte del sistema nervioso periférico que controla los músculos y las glándulas de los órganos internos (por ejemplo, el corazón). Su división simpática estimula; su división parasimpática tranquiliza. (p. 93)
availability heuristic estimating the likelihood of events based on their availability in memory; if instances come readily to mind (perhaps because of their vividness), we presume such events are common. (p. 373)	**heurística de la disponibilidad** estimar la probabilidad de un evento a partir de la disponibilidad de eventos similares en la memoria; si hay instancias que vienen rápidamente a la mente (quizás por su intensidad), suponemos que tales eventos son comunes. (p. 373)
aversive conditioning a type of counterconditioning that associates an unpleasant state (such as nausea) with an unwanted behavior (such as drinking alcohol). (p. 731)	**condicionamiento aversivo** tipo de contra-condicionamiento que asocia estados desagradables (como la náusea) con un comportamiento no deseado (como beber alcohol). (p. 731)
axon the neuron extension that passes messages through its branches to other neurons or to muscles or glands. (p. 82)	**axón** extensión de las neuronas que transmite mensajes a través de sus terminales a otras neuronas o a músculos o glándulas. (p. 82)
B	
babbling stage beginning around 4 months, the stage of speech development in which an infant spontaneously utters various sounds at first unrelated to the household language. (p. 384)	**etapa de balbuceo** etapa de desarrollo del habla, que comienza alrededor de la edad de cuatro meses, en la que un infante repentinamente emite sonidos diversos que al principio no tienen relación con el lenguaje del hogar. (p. 384)

barbiturates drugs that depress central nervous system activity, reducing anxiety but impairing memory and judgment. (p. 257)	**barbitúricos** medicamentos que deprimen la actividad del sistema nervioso central, de tal manera que reducen la ansiedad pero afectan la memoria y el juicio. (p. 257)
basal metabolic rate the body's resting rate of energy output. (p. 411)	**tasa metabólica basal** tasa de producción de energía del cuerpo en reposo. (p. 411)
basic research pure science that aims to increase the scientific knowledge base. (p. 24)	**investigación básica** ciencia pura que busca incrementar la base de conocimiento científico. (p. 24)
basic trust according to Erik Erikson, a sense that the world is predictable and trustworthy; said to be formed during infancy by appropriate experiences with responsive caregivers. (p. 513)	**confianza básica** de acuerdo con Erik Erikson, la sensación según la cual el mundo es un lugar predecible y digno de confianza; se dice que se forma durante la infancia por medio de experiencias apropiadas con cuidadores responsivos. (p. 513)
behavior feedback effect the tendency of behavior to influence our own and others' thoughts, feelings, and actions. (p. 448)	**efecto de retroalimentación del comportamiento** tendencia del comportamiento de influir en los pensamientos, sentimientos y acciones propias y ajenas. (p. 448)
behavior genetics the study of the relative power and limits of genetic and environmental influences on behavior. (pp. 14, 129)	**genética conductual** el estudio del poder relativo y las limitaciones de las influencias genéticas y ambientales sobre el comportamiento. (pp. 14, 129)
behavior therapy therapy that applies learning principles to the elimination of unwanted behaviors. (p. 729)	**terapia del comportamiento** terapia que aplica principios de aprendizaje a la eliminación de comportamientos no deseados. (p. (p. 729)
behavioral approach focuses on the effects of learning on our personality development. (p. 606)	**enfoque conductual** se enfoca en los efectos del aprendizaje en el desarrollo de nuestra personalidad. (p. 606)
behavioral psychology the scientific study of observable behavior, and its explanation by principles of learning. (p. 17)	**psicología del comportamiento** estudio científico del comportamiento observable, y su explicación según principios de aprendizaje. (p. 17)

behaviorism the view that psychology (1) should be an objective science that (2) studies behavior without reference to mental processes. Most psychologists today agree with (1) but not with (2). (pp. 10, 272)	**conductismo** perspectiva según la cual la psicología (1) debe ser una ciencia objetiva que (2) estudia el comportamiento sin referencia a los procesos mentales. La mayoría de los psicólogos están de acuerdo con (1) pero no con (2). (pp. 10, 272)
belief perseverance clinging to one's initial conceptions after the basis on which they were formed has been discredited. (p. 376)	**perseverancia de las creencias** aferrarse a nuestras concepciones iniciales aún cuando las bases que las sostienen han sido desacreditadas. (p. 376)
binge-eating disorder significant binge-eating episodes, followed by distress, disgust, or guilt, but without the compensatory behavior that marks bulimia nervosa. (p. 713)	**trastorno por atracón** episodios de ingestión compulsiva de alimentos, seguidos por angustia, asco o sentimientos de culpa, pero sin el comportamiento de compensación típico de la bulimia nervosa. (p. 713)
binocular cue a depth cue, such as retinal disparity, that depends on the use of two eyes. (p. 189)	**pista binocular** pista de profundidad, como la disparidad retiniana, que depende del uso de ambos ojos. (p. 189)
biofeedback a system for electronically recording, amplifying, and feeding back information regarding a subtle physiological state, such as blood pressure or muscle tension. (p. 296)	**biorretroalimentación** sistema electrónico de grabación, amplificación y retroalimentación de información de un estado psicológico sutil, como la presión arterial o la tensión muscular. (p. 296)
biological psychology the scientific study of the links between biological (genetic, neural, hormonal) and psychological processes. (Some biological psychologists call themselves *behavioral neuroscientists, neuropsychologists, behavior geneticists, physiological psychologists,* or *biopsychologists*.) (p. 17)	**psicología biológica** el estudio científico de la relación entre los procesos biológicos (genéticos, neurales, hormonales) y psicológicos. (Algunos psicólogos biológicos se hacen llamar neurocientíficos del comportamiento, neuropsicólogos, genetistas conductuales, psicólogos de la fisiología, o biopsicólogos). (p. 17)
biomedical therapy prescribed medications or procedures that act directly on the person's physiology. (p. 722)	**terapia biomédica** medicamentos recetados o procedimientos que actúan directamente sobre la psicología de una persona. (p. 722)
biopsychosocial approach	**enfoque biopsicológico**

an integrated approach that incorporates biological, psychological, and social-cultural viewpoints. (p. 17)	enfoque integrado que incorpora perspectivas biológicas, psicológicas y socioculturales. (p. 17)
bipolar disorder a disorder in which a person alternates between the hopelessness and lethargy of depression and the overexcited state of mania. (Formerly called *manic-depressive disorder*.) (p. 687)	**trastorno bipolar** trastorno en el cual una persona alterna entre el letargo y la desesperación de la depresión y la sobreexcitación del estado maníaco. (Anteriormente se conocía como trastorno maníaco-depresivo). (p. 687)
blind spot the point at which the optic nerve leaves the eye, creating a "blind" spot because no receptor cells are located there. (p. 179)	**punto ciego** el punto donde el nervio óptico sale del ojo, y crea así un punto "ciego" por la ausencia de células receptoras en este sitio. (p. 179)
blindsight a condition in which a person can respond to a visual stimulus without consciously experiencing it. (p. 125)	**visión ciega** condición en la cual una persona puede responder a un estímulo visual sin experimentarlo de manera consciente. (p. 125)
bottom-up processing analysis that begins with the sensory receptors and works up to the brain's integration of sensory information. (p. 158)	**procesamiento abajo-arriba** análisis que comienza en los receptores sensoriales y avanza hacia la integración de información sensorial en el cerebro. (p. 158)
brainstem the oldest part and central core of the brain, beginning where the spinal cord swells as it enters the skull; the brainstem is responsible for automatic survival functions. (p. 102)	**tronco cerebral** la parte más vieja del cerebro y el núcleo central del cerebro, que comienza donde la médula se ensancha y entra en el cráneo; el tronco cerebral es responsable de las funciones automáticas de supervivencia . (p. 102)
Broca's area helps control language expression—an area of the frontal lobe, usually in the left hemisphere, that directs the muscle movements involved in speech. (p. 388)	**área de Broca** ayuda a controlar la expresión del lenguaje: región del lóbulo frontal, normalmente en el hemisferio izquierdo, que dirige los movimientos musculares involucrados en el habla. (p. 388)
bulimia nervosa an eating disorder in which a person's binge eating (usually of high-calorie foods) is followed by inappropriate weight-loss promoting behavior, such as vomiting, laxative use, fasting, or excessive exercise.	**bulimia nerviosa** trastorno alimenticio en el cual una persona ingiere compulsivamente alimentos (generalmente altos en calorías) seguido por un comportamiento inadecuado que promueve la pérdida de peso, como el

(p. 713)	vómito, el uso de laxantes, el ayuno o el ejercicio excesivo. (p. 713)
bystander effect the tendency for any given bystander to be less likely to give aid if other bystanders are present. (p. 817)	**efecto del espectador** tendencia que tienen las personas a no brindar ayuda si hay otras personas presentes. (p. 817)
C	
Cannon-Bard theory the theory that an emotion-arousing stimulus simultaneously triggers (1) physiological responses and (2) the subjective experience of emotion. (p. 433)	**teoría de Cannon-Bard** teoría de según la cual un estímulo que despierta emociones puede provocar simultáneamente (1) respuestas fisiológicas y (2) la experiencia subjetiva de la emoción. (p. 433)
case study a descriptive technique in which one individual or group is studied in depth in the hope of revealing universal principles. (p. 44)	**estudio de caso** técnica de observación en la cual se estudia a un individuo o grupo a profundidad con la esperanza de revelar principios universales. (p. 44)
catharsis in psychology, the idea that “releasing” aggressive energy (through action or fantasy) relieves aggressive urges. (p. 460)	**catarsis** en la psicología, la idea según la cual “liberar” energía agresiva (por medio de la acción o fantasía) ayuda a reducir impulsos agresivos en las personas. (p. 460)
cell body the part of a neuron that contains the nucleus; the cell’s life-support center. (p. 82)	**cuerpo celular** la parte de una neurona que contiene el núcleo; soporte vital de la célula. (p. 82)
central nervous system (CNS) the brain and spinal cord. (p. 92)	**sistema nervioso central (CNS, en inglés)** el cerebro y la espina dorsal. (p. 92)
central route persuasion occurs when interested people focus on the arguments and respond with favorable thoughts. (p. 771)	**ruta central de persuasión central** se produce cuando las personas interesadas se centran en los argumentos y responden con pensamientos favorables. (p. 771)
cerebellum [sehr-uh-BELL-um] the “little brain” at the rear of the brainstem; functions include processing sensory input, coordinating movement output and balance, and enabling nonverbal learning and memory. (p. 103)	**cerebelo** el “pequeño cerebro” ubicado en la parte posterior del tronco encefálico; sus funciones incluyen el procesamiento de información sensorial, la coordinación de los movimientos y el equilibrio y la habilitación del lenguaje no verbal y la memoria. (p. 103)

cerebral [seh-REE-bruhl] **cortex** the intricate fabric of interconnected neural cells covering the cerebral hemispheres; the body's ultimate control and information-processing center. (p. 109)	**corteza cerebral** capa delgada de neuronas conectadas entre sí, que forman los hemisferios cerebrales; es el principal centro de control y procesamiento de información del organismo. (p. 109)
change blindness failing to notice changes in the environment; a form of *inattentional blindness*. (p. 161)	**ceguera al cambio** no darse cuenta de cambios en el entorno. Una forma de ceguera por falta de atención. (p. 161)
chromosomes threadlike structures made of DNA molecules that contain the genes. (p. 130)	**cromosomas** estructuras semejantes a hilos conformadas de moléculas de ADN que contienen los genes. (p. 130)
chronic schizophrenia (also called *process schizophrenia*) a form of schizophrenia in which symptoms usually appear by late adolescence or early adulthood. As people age, psychotic episodes last longer and recovery periods shorten. (p. 700)	**esquizofrenia crónica** (también se le dice *esquizofrenia procesal*) tipo de esquizofrenia en la que los síntomas aparecen generalmente en la adolescencia tardía o adultez temprana. A medida que las personas envejecen, los episodios psicóticos se vuelven más largos y los períodos de recuperación se vuelven más cortos. (p. 700)
chunking organizing items into familiar, manageable units; often occurs automatically. (p. 333)	**agrupamiento** organizar artículos en unidades conocidas y manejables; a menudo ocurre automáticamente. (p. 333)
circadian [ser-KAY-dee-an] **rhythm** our biological clock; regular bodily rhythms (for example, of temperature and wakefulness) that occur on a 24-hour cycle. (p. 231)	**ritmo circadiano** reloj biológico; ritmos periódicos del organismo (por ejemplo, el de temperatura y estado de vigilia) que ocurren en ciclos de 24 horas. (p. 231)
classical conditioning a type of learning in which we link two or more stimuli; as a result, to illustrate with Pavlov's classic experiment, the first stimulus (a tone) comes to elicit behavior (drooling) in anticipation of the second stimulus (food). (p. 272)	**condicionamiento clásico** tipo de aprendizaje en el cual aprendemos a relacionar dos o más estímulos; como resultado, con el experimento clásico de Pavlov como ejemplo, el primer estímulo (un timbre) provoca un comportamiento (salivación) en anticipación del segundo estímulo (comida). (p. 272)
client-centered therapy	**terapia centrada en el cliente**

a humanistic therapy, developed by Carl Rogers, in which the therapist uses techniques such as *active listening* within an accepting, genuine, empathic environment to facilitate clients’ growth. (Also called *person-centered therapy*.) (p. 725)	terapia humanística, desarrollada por Carl Rogers, en la cual el o la terapeuta emplea técnicas como *escuchar activamente* dentro de un entorno de genuino de aceptación y empatía para facilitar el crecimiento de sus clientes. (Conocida también como *terapia centrada en la persona*). (p. 725)
clinical psychology a branch of psychology that studies, assesses, and treats people with psychological disorders. (p. 25)	**psicología clínica** rama de la psicología que estudia, evalúa y trata a personas con trastornos psicológicos. (p. 25)
cocaine a powerful and addictive stimulant derived from the coca plant; produces temporarily increased alertness and euphoria. (p. 259)	**cocaína** estimulante potente y adictivo derivado de la planta de coca; aumenta temporalmente el estado de alerta y produce sensaciones de euforia. (p. 259)
cochlea [KOHK-lee-uh] a coiled, bony, fluid-filled tube in the inner ear; sound waves traveling through the cochlear fluid trigger nerve impulses. (p. 199)	**cóclea** estructura tubular en forma de espiral, ósea y rellena de líquido que se halla en el oído interno; las ondas sonoras que pasan por el líquido coclear desencadenan impulsos nerviosos. (p. 199)
cochlear implant a device for converting sounds into electrical signals and stimulating the auditory nerve through electrodes threaded into the cochlea. (p. 201)	**implante coclear** dispositivo que convierte sonidos en señales eléctricas que estimulan el nervio auditivo mediante electrodos enhebrados en la cóclea. (p. 201)
cognition all the mental activities associated with thinking, knowing, remembering, and communicating. (pp. 365, 498)	**cognición** todas las actividades mentales asociadas con pensar, saber, recordar y comunicar. (pp. 365, 498)
cognitive dissonance theory the theory that we act to reduce the discomfort (dissonance) we feel when two of our thoughts (cognitions) are inconsistent. For example, when we become aware that our attitudes and our actions clash, we can reduce the resulting dissonance by changing our attitudes. (p. 773)	**teoría de la disonancia cognitiva** teoría según la cual actuamos para reducir la incomodidad (disonancia) cuando sentimos que dos de nuestros pensamientos (cogniciones) son disonantes. Por ejemplo, cuando nos damos cuenta que hay un choque entre nuestras actitudes y nuestras acciones, podemos reducir la disonancia resultante con cambios de actitud. (p. 773)
cognitive learning the acquisition of mental information,	**aprendizaje cognitivo** adquisición de información mental, ya sea a

whether by observing events, by watching others, or through language. (p. 272)	partir de la observación de acontecimientos, la observación de otras personas o a través del lenguaje. (p. 272)
cognitive map a mental representation of the layout of one's environment. For example, after exploring a maze, rats act as if they have learned a cognitive map of it. (p. 304)	**mapa cognitivo** imagen mental del trazado de nuestro entorno. Por ejemplo, después de recorrer un laberinto, las ratas actúan como si se hubieran aprendido un mapa del laberinto. (p. 304)
cognitive neuroscience the interdisciplinary study of the brain activity linked with cognition (including perception, thinking, memory, and language). (pp. 13, 124)	**neurociencia cognitiva** estudio interdisciplinario de la actividad cerebral relacionada con la cognición (que incluye la percepción, el pensamiento, la memoria y el lenguaje). (pp. 13, 124)
cognitive psychology the study of mental processes, such as occur when we perceive, learn, remember, think, communicate, and solve problems. (p. 13)	**psicología cognitiva** estudio de los procesos mentales, tales como los que ocurren cuando percibimos, aprendemos, recordamos, pensamos, nos comunicamos y resolvemos problemas. (p. 13)
cognitive therapy therapy that teaches people new, more adaptive ways of thinking; based on the assumption that thoughts intervene between events and our emotional reactions. (p. 733)	**terapia cognitiva** enfoque terapéutico en que se les enseña a los pacientes nuevas formas de pensar de un modo más adaptativo. se basa en el supuesto de que los pensamientos intervienen entre los eventos y nuestras reacciones emocionales. (p. 733)
cognitive-behavioral therapy (CBT) a popular integrative therapy that combines cognitive therapy (changing self-defeating thinking) with behavior therapy (changing behavior). (p. 736)	**terapia congnitivo-conductual (CBT, en inglés)** tipo común de terapia integradora que combina la terapia cognitiva (cambia el pensamiento contraproducente) con terapia conductual (cambiar el comportamiento).
cohort a group of people sharing a common characteristic, such as from a given time period. (p. 640)	**cohorte** grupo de personas que comparten cierta característica, por ejemplo, un periodo en el tiempo. (p. 640)
collective unconscious Carl Jung's concept of a shared, inherited reservoir of memory traces from our species' history. (p. 583)	**inconsciente colectivo** concepto propuesto por Carl Jung en relación a un conjunto compartido de recuerdos heredados de la historia de nuestra especie. (p. 583)

collectivism giving priority to the goals of one’s group (often one’s extended family or work group) and defining one’s identity accordingly. (p. 616)	**colectivismo** modo de dar prioridad a las metas del grupo (a menudo de la familia extendida o el grupo de trabajo) y de definir la identidad personal a partir de lo que dicta el grupo. (p. 616)
color constancy perceiving familiar objects as having consistent color, even if changing illumination alters the wavelengths reflected by the object. (p. 192)	**constancia de color** percibir que objetos conocidos tienen un color constante, incluso cuando cambios en la iluminación modifican las longitudes de onda que el objeto refleja. (p. 192)
community psychology a branch of psychology that studies how people interact with their social environments and how social institutions affect individuals and groups. (p. 25)	**psicología comunitaria** rama de la psicología que estudia cómo las personas interactúan con sus entornos sociales y cómo las instituciones afectan a los individuos y a los grupos. (p. 25)
companionate love the deep affectionate attachment we feel for those with whom our lives are intertwined. (p. 813)	**amor compañero** apego afectuoso profundo que sentimos por aquellos con quienes nuestras vidas se entrelazan. (p. 813)
concept a mental grouping of similar objects, events, ideas, or people. (p. 365)	**concepto** agrupamiento mental de objetos, eventos, ideas y personas similares. (p. 365)
concrete operational stage in Piaget’s theory, the stage of cognitive development (from about 7 to 11 years of age) during which children gain the mental operations that enable them to think logically about concrete events. (p. 502)	**etapa del pensamiento lógico-concreto** en la teoría de Piaget, la fase del desarrollo cognitivo (aproximadamente desde los 7 hasta los 11 años de edad) durante la cual los niños adquieren las operaciones mentales que les permiten pensar lógicamente sobre eventos concretos. (p. 502)
conditioned reinforcer a stimulus that gains its reinforcing power through its association with a primary reinforcer; also known as a *secondary reinforcer*. (p. 286)	**reforzador condicionado** estímulo que obtiene sus poderes de reforzamiento a través de una asociación con un reforzador primario; también denominado reforzador secundario. (p. 286)
conditioned response (CR) in classical conditioning, a learned response to a previously neutral (but now conditioned) stimulus (CS). (p. 274)	**respuesta condicionada (rc)** en el condicionamiento clásico, la respuesta aprendida a un estímulo previamente neutral (pero ahora condicionado). (p. 274)

conditioned stimulus (CS) in classical conditioning, an originally neutral stimulus that, after association with an unconditioned stimulus (US), comes to trigger a conditioned response (CR). (p. 274)	**estímulo condicionado (ec)** en el condicionamiento clásico, un estímulo originalmente intrascendente que, después de verse asociado con un estímulo incondicionado (ei) produce una respuesta condicionada. (p. 274)
conduction hearing loss a less common form of hearing loss, caused by damage to the mechanical system that conducts sound waves to the cochlea. (p. 200)	**pérdida de la audición por conducción** tipo menos común de sordera atribuible a daños en el sistema mecánico que conduce ondas sonoras a la cóclea. (p. 200)
cones retinal receptors that are concentrated near the center of the retina and that function in daylight or in well-lit conditions. Cones detect fine detail and give rise to color sensations. (p. 178)	**conos** receptores que se concentran cerca del centro de la retina; con la luz del día o en lugares bien iluminados, los conos detectan detalles finos y producen la sensación del color. (p. 178)
confirmation bias a tendency to search for information that supports our preconceptions and to ignore or distort contradictory evidence. (p. 371)	**sesgo confirmatorio** tendencia a buscar información que confirme nuestras ideas preconcebidas y de hacer caso omiso o de distorsionar las pruebas que las contradigan. (p. 371)
conflict a perceived incompatibility of actions, goals, or ideas. (p. 819)	**conflicto** incompatibilidad percibida de acciones, metas o ideas. (p. 371)
conformity adjusting our behavior or thinking to coincide with a group standard. (p. 776)	**conformidad** tendencia a ajustar el comportamiento o la forma de pensar hasta hacerlos coincidir con las normas de un grupo. (p. 776)
confounding variable a factor other than the factor being studied that might influence a study’s results. (p. 56)	**variable de confusión** factor distinto del factor que se está estudiando que podría afectar los resultados de un estudio. (p. 56)
consciousness our subjective awareness of ourselves and our environment. (pp. 123, 224)	**consciencia** percepción de nosotros mismos y de nuestro entorno. (pp. 123, 224)
conservation the principle (which Piaget believed to be a part of concrete operational reasoning) that	**conservación** principio (que para Piaget forma parte del razonamiento operacional concreto) según el

properties such as mass, volume, and number remain the same despite changes in the forms of objects. (p. 501)	cual ciertas propiedades (ej., masa, volumen y número) no varían pese a modificaciones en la forma de los objetos. (p. 501)
content validity the extent to which a test samples the behavior that is of interest. (p. 637)	**validez del contenido** grado en que las muestras prueban el comportamiento que es de interés. (p. 637)
continuous reinforcement schedule reinforcing the desired response every time it occurs. (p. 287)	**reforzamiento continuo** reforzar la respuesta deseada cada vez que ocurre. (p. 287)
control group in an experiment, the group *not* exposed to the treatment; contrasts with the experimental group and serves as a comparison for evaluating the effect of the treatment. (p. 54)	**grupo control** en un experimento, el grupo de participantes que no se expone al tratamiento; el grupo de control sirve de comparación para evaluar el efecto del tratamiento en el grupo sometido al tratamiento. (p. 54)
convergent thinking narrowing the available problem solutions to determine the single best solution. (p. 366)	**razonamiento convergente** reducción de las soluciones disponibles con el fin de determinar cuál es la mejor solución a un problema. (p. 366)
conversion disorder a disorder related to somatic symptom disorder in which a person experiences very specific, physical symptoms that are not compatible with recognized medical or neurological conditions. (Also called functional neurological symptom disorder.) (p. 707)	**trastorno de conversión** trastorno relacionado con un trastorno de síntomas somáticos, donde una persona experimenta síntomas físicos muy específicos que no son compatibles con condiciones médicas o neurológicas reconocidas. (También conocido como trastorno de síntomas neurológicos). (p. 707)
cornea the eye’s clear, protective outer layer, covering the pupil and iris. (p. 177)	**córnea** capa protectora transparente exterior del ojo, que cubre la pupila y el iris. (p. 177)
coronary heart disease the clogging of the vessels that nourish the heart muscle; the leading cause of death in many developed countries. (p. 459)	**enfermedad coronaria** obstrucción de los vasos que nutren el músculo cardíaco; causa principal de muerte en los Estados Unidos y muchos otros países. (p. 459)
corpus callosum [KOR-pus kah-LOW-sum] the large band of neural fibers connecting the two brain hemispheres and carrying messages between them. (p. 120)	**cuerpo calloso** banda grande de fibras neuronales que conecta los dos hemisferios del cerebro y transmite mensajes entre ellos. (p. 120)

correlation a measure of the extent to which two factors vary together, and thus of how well either factor predicts the other. (p. 51)	**correlación** medida del grado en que dos factores varían juntos y por ende, si uno puede predecir al otro. (p. 51)
correlation coefficient a statistical index of the relationship between two things (from −1.00 to +1.00). (p. 51)	**coeficiente de correlación** índice estadístico de la relación entre dos cosas (del -1.00 al +1.00). (p. 51)
counseling psychology a branch of psychology that assists people with problems in living (often related to school, work, or marriage) and in achieving greater well-being. (p. 25)	**psciología de consejería** rama de la psicología que ayuda a las personas con problemas de la vida diaria (a veces relacionado con la escuela, en el trabajo, o con el matrimonio) y les ayuda a encontrar mayor bienestar. (p. 25)
counterconditioning behavior therapy procedures that use classical conditioning to evoke new responses to stimuli that are triggering unwanted behaviors; include *exposure therapies* and *aversive conditioning*. (p. 729)	**contracondicionamiento** técnicas de terapia conductual que se valen del condicionamiento clásico para provocar respuestas alternativas a estímulos que producen comportamientos no deseados; incluye las terapias de exposición y el condicionamiento aversivo. (p. 729)
creativity the ability to produce new and valuable ideas. (p. 366)	**creatividad** capacidad para generar ideas novedosas y valiosas. (p. 636)
critical period an optimal period early in the life of an organism when exposure to certain stimuli or experiences produces normal development. (p. 510)	**período crítico** etapa inicial de la vida de los organismos, en la cual son necesarios ciertos estímulos o experiencias para permitir su desarrollo normal. (p. 510)
critical thinking thinking that does not blindly accept arguments and conclusions. Rather, it examines assumptions, appraises the source, discerns hidden biases, evaluates evidence, and assesses conclusions. (p. 4)	**pensamiento crítico** forma de pensar que no admite razones ni conclusiones ciegamente. En cambio, se evalúan las fuentes, se buscan los sesgos ocultos, se analiza la evidencia y se estudian las conclusiones. (p. 4)
cross-sectional study research that compares people of different ages at the same point in time. (pp. 563, 640)	**estudio de corte transversal** estudio en el que personas de diferentes edades se comparan unas con otras en un mismo punto en el tiempo. (pp. 563, 640)
crystallized intelligence	**inteligencia cristalizada**

our accumulated knowledge and verbal skills; tends to increase with age. (p. 640)	todos los conocimientos y capacidades verbales que acumulamos; tiende a aumentar con la edad. (p. 640)
CT (computed tomography) scan a series of X-ray photographs taken from different angles and combined by computer into a composite representation of a slice of the brain’s structure. (Also called CAT scan.) (p. 99)	**TC (tomografía computarizada)** serie de imágenes de rayos-X tomadas desde ángulos distintos y combinadas por computadora para formar una representación compuesta de un corte de la estructura cerebral (conocida también cono exploración TAC). (p. 99)
culture the enduring behaviors, ideas, attitudes, values, and traditions shared by a group of people and transmitted from one generation to the next. (pp. 15, 789)	**cultura** ideas, actitudes, valores y tradiciones preponderantes compartidas por un grupo de personas y que se transmiten de generación en generación. (pp. 15, 789)
D	
debriefing the postexperimental explanation of a study, including its purpose and any deceptions, to its participants. (p. 62)	**rendición de informes** explicación que se les da a los participantes de un estudio sobre sus fines y los posibles engaños que los investigadores pudieron haber utilizado. (p. 62)
deep processing encoding semantically, based on the meaning of the words; tends to yield the best retention. (p. 335)	**procesamiento profundo** codificación semántica basada en el significado de las palabras; suele ser ideal para la retención. (p. 335)
defense mechanisms in psychoanalytic theory, the ego’s protective methods of reducing anxiety by unconsciously distorting reality. (p. 581)	**mecanismos de defensa** en la teoría del psicoanálisis, los métodos de protección del ego para reducir la ansiedad mediante la distorsión inconsciente de la realidad. (p. 581)
deindividuation the loss of self-awareness and self-restraint occurring in group situations that foster arousal and anonymity. (p. 786)	**desindividualización** pérdida de la identidad personal y del autocontrol en situaciones de grupo que fomentan la excitación y el anonimato. (p. 786)
déjà vu that eerie sense that “I’ve experienced this before.” Cues from the current situation may unconsciously trigger retrieval of an earlier experience. (p. 358)	***déjà vu*** sensación extraña de haber vivido antes una experiencia específica. Ciertas pistas del presente inmediato pueden evocar una vivencia previa. (p. 358)

delta waves the large, slow brain waves associated with the deep sleep of NREM-3. (p. 234)	**ondas delta** ondas cerebrales grandes y lentas asociadas con el sueño profundo tipo NMOR. (p. 234)
delusion a false belief, often of persecution or grandeur, that may accompany psychotic disorders. (p. 699)	**delirio** creencias falsas, a menudo de persecución o de grandeza que pueden acompañar a trastornos psicóticos. (p. 699)
dendrites a neuron’s often bushy, branching extensions that receive and integrate messages, conducting impulses toward the cell body. (p. 82)	**dendritas** prolongaciones de las neuronas que reciben mensajes y envían impulsos hacia el cuerpo neuronal. (p. 82)
dependent variable in an experiment, the outcome that is measured; the variable that may change when the independent variable is manipulated. (p. 56)	**variable dependiente** el valor que se mide en un experimento;. es la variable que puede cambiar cuando se manipula la variable independiente. (p. 56)
depressants drugs (such as alcohol, barbiturates, and opiates) that reduce neural activity and slow body functions. (p. 255)	**depresivos** agentes químicos (como el alcohol, los barbitúricos y los opioides) que reducen (deprimen) la actividad neuronal y disminuyen las funciones del organismo. (p. 255)
depth perception the ability to see objects in three dimensions although the images that strike the retina are two-dimensional; allows us to judge distance. (p. 189)	**percepción de la profundidad** capacidad de ver objetos en tres dimensiones aún cuando las imágenes percibidas por la retina son bidimensionales. Nos permite juzgar la distancia. (p. 189)
descriptive statistics numerical data used to measure and describe characteristics of groups. Includes measures of central tendency and measures of variation. (p. 66)	**estadística descriptiva** datos numéricos que se usan para medir y describir características de grupos. Incluye medidas de tendencia central y medidas de variación. (p. 66)
developmental psychology a branch of psychology that studies physical, cognitive, and social change throughout the life span. (pp. 24, 486)	**psicología del desarrollo** rama de la psicología que estudia los cambios físicos, cognitivos y sociales que ocurren a lo largo de la vida. (pp. 24, 486)
difference threshold the minimum difference between two stimuli required for detection 50 percent of the time.	**umbral de diferencia** la diferencia mínima entre dos estímulos que una persona puede detectar el 50 por ciento

We experience the difference threshold as a *just noticeable difference* (or *jnd*). (p. 163)	de las veces. El umbral diferencial se experimenta como una *diferencia apenas perceptible* (o *jnd*, en inglés). (p. 163)
discrimination (1) in classical conditioning, the learned ability to distinguish between a conditioned stimulus and similar stimuli that do not signal an unconditioned stimulus. (In operant conditioning, the ability to distinguish responses that are reinforced from similar responses that are not reinforced.) (2) in social psychology, unjustifiable negative behavior toward a group and its members. (pp. 277, 792)	**discriminación** (1) según el condicionamiento clásico, es la capacidad aprendida de distinguir entre un estímulo condicionado y otros estímulos sin trascendencia. (en el condicionamiento operante, la capacidad de distinguir las respuestas que son reforzadas de las que no lo son). (2) en psicología social, comportamiento negativo injustificado contra un grupo y sus miembros. (pp. 277, 792)
discriminative stimulus in operant conditioning, a stimulus that elicits a response after association with reinforcement (in contrast to related stimuli not associated with reinforcement). (p. 285)	**estímulo discriminativo** en el condicionamiento operante, un estímulo que genera una respuesta después de ser asociado con un reforzamiento (en contraste con estímulos relacionados que no están asociados con un reforzamiento). (p. 285)
dissociation a split in consciousness, which allows some thoughts and behaviors to occur simultaneously with others. (p. 227)	**disociación** una apertura en el conocimiento consciente que permite que algunos pensamientos y comportamientos ocurran en forma simultánea con otros. (p. 227)
dissociative disorders controversial, rare disorders in which conscious awareness becomes separated (dissociated) from previous memories, thoughts, and feelings. (p. 708)	**trastornos disociativos** trastornos poco comunes, polémicos y controvertidos en los cuales el conocimiento consciente se separa (si desasocia) de recuerdos, pensamientos y sentimientos previos. (p. 708)
dissociative identity disorder (DID) a rare dissociative disorder in which a person exhibits two or more distinct and alternating personalities. (Formerly called *multiple personality disorder*.) (p. 708)	**trastorno disociativo de identidad (TDI)** trastorno disociativo poco común, en el cual una persona exhibe dos o más personalidades claramente definidas que se alternan entre sí. (También se denomina trastorno de *personalidad múltiple*) (p. 708)
divergent thinking expanding the number of possible problem solutions; creative thinking that diverges in different directions. (p. 366)	**razonamiento divergente** expansión del número de soluciones a un problema. Pensamiento creativo que se ramifica en múltiples direcciones. (p. 366)

DNA (deoxyribonucleic acid) a complex molecule containing the genetic information that makes up the chromosomes. (p. 130)	**ADN (ácido desoxirribonucleico)** molécula compleja que contiene la información genética de la que se constituyen los cromosomas. (p. 130)
double-blind procedure an experimental procedure in which both the research participants and the research staff are ignorant (blind) about whether the research participants have received the treatment or a placebo. Commonly used in drug-evaluation studies. (p. 55)	**procedimiento doble ciego** en un experimento, procedimiento en el cual tanto los participantes como el personal de investigación ignoran (van a ciegas) quién ha recibido el tratamiento y quién el placebo. (p. 55)
Down syndrome a condition of mild to severe intellectual disability and associated physical disorders caused by an extra copy of chromosome 21. (p. 644)	**síndrome de Down** trastorno de discapacidad intelectual leve o grave que se presenta junto a otras discapacidades físicas que ocurren a causa de una copia adicional del cromosoma 21. (p. 644)
dream a sequence of images, emotions, and thoughts passing through a sleeping person's mind. (p. 247)	**sueño** secuencia de imágenes, emociones y pensamientos que fluyen en la mente de una persona dormida. (p. 247)
drive-reduction theory the idea that a physiological need creates an aroused state (a drive) that motivates an organism to satisfy the need. (p. 403)	**teoría de la reducción del impulso** concepto según el cual una necesidad fisiológica crea un estado de excitación (un impulso) que motiva al organismo a satisfacer tal necesidad. (p. 403)
DSM-5 the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition; a widely used system for classifying psychological disorders. (p. 669)	**DSM-5** *Manual estadístico y de diagnóstico de trastornos mentales*, de la Asociación Norteamericana de Psiquiatría, quinta edición. Sistema ampliamente utilizado para clasificar los trastornos psicológicos. (p. 669)
dual processing the principle that information is often simultaneously processed on separate conscious and unconscious tracks. (p. 125)	**procesamiento dual** principio que sostiene que la información se procesa simultáneamente en vías separadas conscientes e inconscientes. (p. 125)
E	
echoic memory a momentary sensory memory of auditory stimuli; if attention is elsewhere, sounds and	**memoria ecoica** memoria sensorial momentánea de estímulos auditivos; aún cuando uno no presta

words can still be recalled within 3 or 4 seconds. (p. 332)	atención, es posible recordar palabras por 3 o 4 segundos. (p. 332)
eclectic approach an approach to psychotherapy that uses techniques from various forms of therapy. (p. 723)	**enfoque ecléctico** enfoque de psicoterapia que emplea técnicas de varias formas de terapia. (p. 723)
Ecstasy (MDMA) a synthetic stimulant and mild hallucinogen. Produces euphoria and social intimacy, but with short-term health risks and longer-term harm to serotonin-producing neurons and to mood and cognition. (p. 261)	**éxtasis (MDMA)** estimulante sintético que produce un ligero efecto alucinógeno. Produce euforia e intimidad social, pero con riesgos de corto plazo para la salud y daños a largo plazo para el ánimo, para el proceso de cognición y para las neuronas productoras de serotonina. (p. 261)
educational psychology the study of how psychological processes affect and can enhance teaching and learning. (p. 24)	**psicología educativa** el estudio de cómo los procesos psicológicos afectan y mejoran la enseñanza y el aprendizaje. (p. 24)
EEG (electroencephalogram) an amplified recording of the waves of electrical activity sweeping across the brain's surface. These waves are measured by electrodes placed on the scalp. (p. 99)	**EEG (electroencefalograma)** el registro de las ondas de actividad eléctrica que circulan por la superficie del cerebro. Las ondas se miden a través de electrodos colocados sobre el cuero cabelludo. (p. 99)
effortful processing encoding that requires attention and conscious effort. (p. 330)	**procesamiento con esfuerzo** codificación que requiere de atención y esfuerzo conscientes. (p. 33)
ego the largely conscious, "executive" part of personality that, according to Freud, mediates among the demands of the id, superego, and reality. The ego operates on the *reality principle*, satisfying the id's desires in ways that will realistically bring pleasure rather than pain. (p. 580)	**ego** entre las exigencias del id, el superego y la realidad. El ego opera según el *principio de realidad*, para satisfacer los deseos del id en formas que de manera realista le brindarían placer en lugar de dolor. (p. 580)
egocentrism in Piaget's theory, the preoperational child's difficulty taking another's point of view. (p. 501)	**egocentrismo** según la teoría de Piaget, la dificultad de los niños en la etapa preoperacional para aceptar un punto de vista ajeno. (p. 501)
electroconvulsive therapy (ECT)	**terapia electroconvulsiva (TEC)**

a biomedical therapy for severely depressed patients in which a brief electric current is sent through the brain of an anesthetized patient. (p. 756)	terapia biomédica para pacientes gravemente deprimidos en la que se envía una corriente eléctrica de corta duración a través del cerebro de un paciente anestesiado. (p. 756)
embodied cognition the influence of bodily sensations, gestures, and other states on cognitive preferences and judgments. (p. 214)	**cognición incorporada** la influencia de sensaciones del organismo, y otros estados sobre las preferencias y juicios cognitivos. (p. 214)
embryo the developing human organism from about 2 weeks after fertilization through the second month. (p. 489)	**embrión** etapa de desarrollo del organismo humano a partir de las dos semanas después de fertilización hasta el segundo mes. (p. 489)
emerging adulthood a period from about age 18 to the mid-twenties, when many in Western cultures are no longer adolescents but have not yet achieved full independence as adults. (p. 542)	**madurez emergente** etapa que se extiende desde los 18 hasta alrededor de los 25 años, durante la cual muchas personas en los países occidentales ya no son adolescentes pero aún no han alcanzado la independencia plena de un adulto. (p. 542)
emotion a response of the whole organism, involving (1) physiological arousal, (2) expressive behaviors, and (3) conscious experience. (p. 433)	**emoción** reacción que involucra a todo el organismo e incluye (1) excitación fisiológica, (2) comportamientos expresivos y (3) experiencia consciente. (p. 433)
emotion-focused coping attempting to alleviate stress by avoiding or ignoring a stressor and attending to emotional needs related to our stress reaction. (p. 306)	**superación con enfoque en las emociones** medidas para sobrellevar las tensiones enfocándose en aliviar o hacer caso omiso de una situación estresante y atender las necesidades emocionales relacionadas con nuestra reacción al estrés. (p. 306)
emotional intelligence the ability to perceive, understand, manage, and use emotions. (p. 629)	**inteligencia emocional** capacidad de percibir, entender, administrar y hacer uso de las emociones. (p. 629)
empirically derived test a test (such as the MMPI) created by selecting from a pool of items those that discriminate between groups. (p. 599)	**prueba empírica** una prueba (por ejemplo, la MMPI) creada al seleccionar, de un conjunto de elementos, a aquellos que discriminan entre grupos. (p. 599)
empiricism	**empirismo**

the idea that knowledge comes from experience, and that observation and experimentation enable scientific knowledge. (p. 7)	idea según la cual el conocimiento nace de la experiencia y la observación y la experimentación habilitan el conocimiento científico. (p. 7)
encoding specificity principle the idea that cues and contexts specific to a particular memory will be most effective in helping us recall it. (p. 345)	**principio de especificidad de codificación** idea según la cual las pistas y los contextos específicos de un recuerdo particular serán las más efectivas para ayudarnos a recordarlo. (p. 345)
encoding the process of getting information into the memory system— for example, by extracting meaning. (p. 329)	**codificación** el proceso de ingresar información al sistema de memoria; por ejemplo, mediante la extracción de significado. (p. 329)
endocrine [EN-duh-krin] **system** the body's "slow" chemical communication system; a set of glands that secrete hormones into the bloodstream. (p. 95)	**sistema endócrino** sistema "lento" de comunicación química del cuerpo; conjunto de glándulas que secretan hormonas al torrente sanguíneo. (p. 95)
endorphins [en-DOR-fins] "morphine within"—natural, opiate-like neurotransmitters linked to pain control and to pleasure. (p. 88)	**endorfinas** "morfina interna"; neurotransmisores naturales similares a los opiáceos que están asociados con el control del dolor y con el placer. (p. 88)
environment every nongenetic influence, from prenatal nutrition to the people and things around us. (p. 129)	**entorno** toda influencia externa, desde la alimentación prenatal hasta el apoyo social que se recibe más adelante en la vida. (p. 129)
epigenetics "above" or "in addition to" *(epi)* genetics; the study of environmental influences on gene expression that occur without a DNA change. (pp. 137, 668)	**epigenética** "encima de" o "además de" (*epi*) genética; estudio de la influencia ambiental sobre la expresión de los genes que ocurre sin un cambio de ADN. (pp. 137, 668)
episodic memory explicit memory of personally experienced events; one of our two conscious memory systems (the other is *semantic memory*). (p. 340)	**memoria episódica** memoria explícita de eventos experimentados personalmente. Uno de los dos sistemas de memoria conscientes (el otro es la *memoria semántica*). (p. 340)
equity a condition in which people receive from a	**equidad** condición en la cual la persona recibe de

relationship in proportion to what they give to it. (p. 813)	manera proporcional lo que aporta a una relación. (p. 813)
estrogens sex hormones, such as estradiol, that contribute to female sex characteristics and are secreted in greater amounts by females than by males. Estrogen levels peak during ovulation. In nonhuman mammals, this promotes sexual receptivity. (p. 418)	**estrógenos** hormonas sexuales, como el estradiol, secretadas en mayor cantidad en la mujer que en el hombre. Los niveles de estrógeno alcanzan su nivel máximo durante la ovulación. En los animales mamíferos esto facilita la receptividad sexual. (p. 418)
evidence-based practice clinical decision making that integrates the best available research with clinical expertise and patient characteristics and preferences. (p. 744)	**práctica basada en la evidencia** toma de decisiones clínicas que integra lo mejor de las investigaciones disponibles con la especialización clínica y las características y preferencias del paciente. (p. 744)
evolutionary psychology the study of the evolution of behavior and the mind, using principles of natural selection. (pp. 14, 141)	**psicología evolutiva** estudio de la evolución del comportamiento y la mente, que emplea los principios de la selección natural. (pp. 14, 141)
experiment a research method in which an investigator manipulates one or more factors (independent variables) to observe the effect on some behavior or mental process (the dependent variable). By *random assignment* of participants, the experimenter aims to control other relevant factors. (p. 54)	**experimento** método de investigación en el cual el investigador manipula uno o más factores (variables independientes) para observar su efecto en un comportamiento o proceso mental (variable dependiente). Al ser los participantes *asignados de manera aleatoria*, los investigadores procuran controlar otros factores relevantes. (p. 54)
experimental group in an experiment, the group exposed to the treatment, that is, to one version of the independent variable. (p. 54)	**grupo experimental** sujetos de un experimento que están expuestos al tratamiento, o sea, a una versión de la variable independiente. (p. 54)
explicit memory retention of facts and experiences that one can consciously know and “declare.” (Also called *declarative memory*.) (p. 330)	**memoria explícita** retención de hechos y vivencias personales que tenemos la capacidad de reconocer y “expresar” conscientemente. También se le dice *memoria declarativa*. (p. 330)
exposure therapies behavioral techniques, such as *systematic desensitization* and *virtual reality exposure therapy*, that treat anxieties by exposing	**terapias de exposición** técnicas conductuales, como la *desensibilización sistemática* y la *terapia de exposición a una realidad virtual* para tratar

people (in imaginary or actual situations) to the things they fear and avoid. (p. 730)	la ansiedad exponiendo a la persona (en situaciones imaginarias o reales) a las cosas que teme y evita. (p. 730)
external locus of control the perception that chance or outside forces beyond our personal control determine our fate. (p. 309)	**centro de control externo** impresión de que nuestro destino está determinado por el azar o por fuerzas que están más allá de nuestro control. (p. 309)
extinction the diminishing of a conditioned response; occurs in classical conditioning when an unconditioned stimulus (US) does not follow a conditioned stimulus (CS); occurs in operant conditioning when a response is no longer reinforced. (p. 276)	**extinción** disminución de una respuesta condicionada; sucede en el condicionamiento clásico cuando un estímulo incondicionado no sigue a un estímulo condicionado; en el condicionamiento operante, disminución de una respuesta cuando deja de ser reforzada. (p. 276)
extrasensory perception (ESP) the controversial claim that perception can occur apart from sensory input; includes telepathy, clairvoyance, and precognition. (p. 172)	**percepción extrasensorial (PES)** la afirmación polémica de que la percepción puede ocurrir aislada de la recepción sensorial; incluye la telepatía, la clarividencia y las premoniciones. (p. 172)
extrinsic motivation a desire to perform a behavior to receive promised rewards or avoid threatened punishment. (p. 305)	**motivación extrínseca** deseo de llevar a cabo un comportamiento para obtener una recompensa o evitar el castigo. (p. 305)
F	
facial feedback effect the tendency of facial muscle states to trigger corresponding feelings such as fear, anger, or happiness. (p. 447)	**efecto de reacción facial** tendencia de los músculos faciales a provocar sentimientos correspondientes como el miedo, el enojo o la felicidad. (p. 447)
factor analysis a statistical procedure that identifies clusters of related items (called factors) on a test; used to identify different dimensions of performance that underlie a person's total score. (p. 626)	**análisis de factores** procedimiento estadístico que identifica conjuntos de artículos relacionados (conocidos como factores) en una prueba; se usa para identificar distintas dimensiones del desempeño que subyace el puntaje total de una persona. (p. 626)
family therapy therapy that treats people in the context of their family system. Views an individual's unwanted behaviors as influenced by, or	**terapia de familia** tipo de terapia que trata a las personas en el contexto de su sistema familiar. Esta terapia considera que los comportamientos no

directed at, other family members. (p. 737)	deseados de una persona son influenciados por otros miembros de la familia o están dirigidos hacia ellos. (p. 737)
feature detectors nerve cells in the brain’s visual cortex that respond to specific features of the stimulus, such as shape, angle, or movement. (p. 183)	**detectores específicos** células nerviosas del cerebro que responden a características específicas de un estímulo, como las formas, los ángulos y el movimiento. (p. 183)
feel-good, do-good phenomenon people’s tendency to be helpful when in a good mood. (p. 473)	**fenómeno de sentirse bien y hacer el bien** tendencia a ayudar a los demás cuando estamos de buen humor. (p. 473)
fetal alcohol syndrome (FAS) physical and cognitive abnormalities in children caused by a pregnant woman’s heavy drinking. In severe cases, signs include a small, out-of-proportion head and abnormal facial features. (p. 490)	**síndrome de alcoholismo fetal (SAF)** anomalías físicas y cognitivas en los niños causadas por la intensa ingestión de alcohol de la madre durante el embarazo. En casos agudos, los síntomas incluyen desproporciones en el tamaño de la cabeza, que puede ser demasiado pequeña y rasgos faciales anormales. (p. 490)
fetus the developing human organism from 9 weeks after conception to birth. (p. 489)	**feto** organismo humano en vías de desarrollo desde las 9 semanas de concepción hasta el nacimiento. (p. 489)
figure-ground the organization of the visual field into objects (the *figures*) that stand out from their surroundings (the *ground*). (p. 187)	**figura-trasfondo** organización del campo visual en objetos (*las figuras*) que se distinguen de sus entornos (*los trasfondos*). (p. 187)
fixation (1) in cognition, the inability to see a problem from a new perspective; an obstacle to problem solving. (2) in personality theory, according to Freud, a lingering focus of pleasure-seeking energies at an earlier psychosexual stage, in which conflicts were unresolved. (pp. 371, 581)	**fijación** (1) en términos cognitivos la incapacidad de ver un problema desde una perspectiva nueva; un impedimento para resolver problemas. (2) en la teoría de la personalidad, según Freud, un foco persistente de energías en busca del placer en una etapa psicosexual anterior en la que los conflictos todavía no estaban resueltos. (pp. 371, 581)
fixed-interval schedule in operant conditioning, a reinforcement schedule that reinforces a response only after a specified time has elapsed. (p. 288)	**cronograma de intervalo fijo** según el condicionamiento operante, cronograma de reforzamiento que refuerza la respuesta solo después de haber transcurrido un tiempo específico. (p. 288)

fixed-ratio schedule in operant conditioning, a reinforcement schedule that reinforces a response only after a specified number of responses. (p. 288)	**cronograma de proporción fija** según el condicionamiento operante, cronograma de reforzamiento que refuerza la respuesta solo después de darse un número específico de respuestas. (p. 288)
flashbulb memory a clear, sustained memory of an emotionally significant moment or event. (p. 342)	**memoria de flash** memoria clara de un momento o evento emocionalmente significativo. (p. 342)
fluid intelligence our ability to reason speedily and abstractly; tends to decrease with age, especially during late adulthood. (p. 640)	**inteligencia fluida** nuestra capacidad para razonar de manera rápida y abstracta; tiende a disminuir con la edad, especialmente en la vejez. (p. 640)
fMRI (functional MRI) a technique for revealing bloodflow and, therefore, brain activity by comparing successive MRI scans. fMRI scans show brain function as well as structure. (p. 100)	**IRMf (imagen de resonancia magnética funcional)** técnica para observar la circulación de la sangre y, por lo tanto, la actividad cerebral mediante la comparación de imágenes de resonancia magnética sucesivas. Las imágenes de resonancia magnética funcional muestran el funcionamiento del cerebro. (p. 100)
foot-in-the-door phenomenon the tendency for people who have first agreed to a small request to comply later with a larger request. (p. 771)	**fenómeno del pie en la puerta** tendencia de la gente a acceder primero a una solicitud menor para después acceder a una solicitud más significativa. (p. 771)
formal operational stage in Piaget’s theory, the stage of cognitive development (normally beginning about age 12) during which people begin to think logically about abstract concepts. (p. 502)	**período operacional formal** en la teoría de Piaget, el período en el desarrollo cognitivo (normalmente empieza a los 12 años) durante el que la persona empieza a pensar lógicamente sobre conceptos abstractos. (p. 502)
fovea the central focal point in the retina, around which the eye’s cones cluster. (p. 179)	**fovea** el punto central de enfoque en la retina, alrededor del cuál se agrupan los conos del ojo. (p. 179)
framing the way an issue is posed; how an issue is worded can significantly affect decisions and judgments. (p. 376)	**encuadre** forma en que se presenta un asunto; el encuadre puede influir considerablemente en las decisiones y las opiniones. (p. 376)

fraternal (dizygotic) twins develop from separate fertilized eggs. They are genetically no closer than ordinary brothers and sisters, but they share a prenatal environment. (p. 132)	**gemelos fraternos (dizigóticos)** se desarrollan de dos óvulos fecundados. Genéticamente no son más cercanos que los hermanos y hermanas, pero comparten un entorno prenatal. (p. 132)
free association in psychoanalysis, a method of exploring the unconscious in which the person relaxes and says whatever comes to mind, no matter how trivial or embarrassing. (p. 579)	**asociación libre** en psicoanálisis, método de explorar el inconsciente en el que la persona se relaja y dice lo primero que le viene a la mente, sin importar si es poco importante o incómodo. (p. 579)
frequency the number of complete wavelengths that pass a point in a given time (for example, per second). (p. 198)	**frecuencia** número de ondas completas que pasan un punto en un tiempo dado (por ejemplo, por segundo). (p. 198)
frequency theory in hearing, the theory that the rate of nerve impulses traveling up the auditory nerve matches the frequency of a tone, thus enabling us to sense its pitch. (Also called *temporal theory*.) (p. 202)	**teoría de frecuencias** en la audición, la teoría según la cual la tasa de impulsos nerviosos que viajan por el nervio auditivo coincide con la frecuencia de un tono, lo cual nos permite percibir su tono. (Se conoce también como teoría *temporal*) (p. 202)
frontal lobes the portion of the cerebral cortex lying just behind the forehead; involved in speaking and muscle movements and in making plans and judgments. (p. 109)	**lóbulos frontales** porción de la corteza cerebral que se halla inmediatamente detrás de la frente; se relaciona con el habla y los movimientos musculares y con la planificación y la formación de juicios. (p. 109)
frustration-aggression principle the principle that frustration—the blocking of an attempt to achieve some goal—creates anger, which can generate aggression. (p. 803)	**principio de frustración-agresión** principio según el cual la frustración —el bloqueo de un intento para lograr alguna meta— crea ira, y por consecuencia puede generar agresión. (p. 803)
functionalism an early school of thought promoted by James and influenced by Darwin; explored how mental and behavioral processes function—how they enable the organism to adapt, survive, and flourish. (p. 8)	**funcionalismo** escuela temprana de pensamiento promovida por James e influenciada por Darwin; exploró el funcionamiento de los procesos mentales y conductuales–y cómo habilitan al organismo para adaptarse, sobrevivir y florecer. (p. 8)
fundamental attribution error	**error de atribución fundamental**

the tendency for observers, when analyzing others' behavior, to underestimate the impact of the situation and to overestimate the impact of personal disposition. (p. 768)	tendencia de los observadores, cuando analizan el comportamiento ajeno, a sobrestimar el impacto de la situación y sobreestimar el impacto de la disposición personal. (p. 768)
G	
gate-control theory the theory that the spinal cord contains a neurological "gate" that blocks pain signals or allows them to pass on to the brain. The "gate" is opened by the activity of pain signals traveling up small nerve fibers and is closed by activity in larger fibers or by information coming from the brain. (p. 207)	**teoría de la compuerta** teoría según la cual la médula espinal contiene una "compuerta neurológica" que bloquea señales de dolor o permite que lleguen al cerebro. La "compuerta" se abre con la actividad de señales de dolor que viajan por fibras nerviosas pequeñas y se cierra con la actividad de fibras más grandes o con información que llega del cerebro. (p. 207)
gender identity our sense of being male, female, or some combination of the two. (p. 525)	**identidad de género** nuestra sensación personal de ser varón o mujer, o combinación de ambas. (p. 525)
gender in psychology, the socially influenced characteristics by which people define *boy, girl, man,* and *woman*. (p. 520)	**género** en la psicología las características sociales que las personas emplean para definir *niño, niña, hombre* y *mujer*. (p. 520)
gender role a set of expected behaviors, attitudes, and traits for males or for females. (p. 525)	**papel de género** conjunto de expectativas, actitudes y rasgos de cómo las mujeres y los hombres deben ser o comportarse. (p. 525)
gender typing the acquisition of a traditional masculine or feminine role. (p. 525)	**tipificación por género** la adquisición de un papel masculino o femenino tradicional. (p. 525)
general adaptation syndrome (GAS) Selye's concept of the body's adaptive response to stress in three phases—alarm, resistance, exhaustion. (p. 454)	**síndrome de adaptación general** término usado por Selye para referirse a la respuesta adaptiva del cuerpo ante estrés, que se da en tres etapas: alarma, resistencia y agotamiento. (p. 454)
general intelligence (g) according to Spearman and others, underlies all mental abilities and is therefore measured by every task on an intelligence test. (p. 626)	**factor g de inteligencia general** según Spearman y otros, subyace todas las habilidades mentales específicas y es, por tanto, cuantificado por cada función en una prueba de inteligencia. (p. 626)

generalization the tendency, once a response has been conditioned, for stimuli similar to the conditioned stimulus to elicit similar responses. (In operant conditioning, generalization occurs when responses learned in one situation occur in other, similar situations.) (p. 276)	**generalización** según el condicionamiento clásico, tendencia posterior al condicionamiento, de responder de manera similar a los estímulos que se parecen al estímulo condicionado. (En el condicionamiento operante, se produce una generalización cuando se refuerzan también las respuestas a estímulos similares.) (p. 276)
generalized anxiety disorder an anxiety disorder in which a person is continually tense, apprehensive, and in a state of *autonomic nervous system* arousal. (p. 677)	**trastorno de ansiedad general** trastorno de ansiedad en el cual una persona está constantemente tensa, asustada y con el *sistema nervioso autónomo* activado. (p. 677)
genes the biochemical units of heredity that make up the chromosomes; segments of DNA capable of synthesizing proteins. (p. 130)	**genes** unidades bioquímicas de la herencia que forman los cromosomas; segmentos de DNA capaces de sintetizar proteínas. (p. 130)
genome the complete instructions for making an organism, consisting of all the genetic material in that organism's chromosomes. (p. 130)	**genoma** instrucciones completas para crear un organismo; consiste en todo el material genético en los cromosomas de ese organismo. (p. 130)
gestalt an organized whole. Gestalt psychologists emphasized our tendency to integrate pieces of information into meaningful wholes. (p. 187)	**Gestalt** un todo organizado. Los psicólogos de la Gestalt enfatizan nuestra tendencia a integrar segmentos de información en organismos únicos significativos. (p. 187)
glial cells (glia) cells in the nervous system that support, nourish, and protect neurons; they also play a role in learning, thinking, and memory. (p. 82)	**células gliales** células del sistema nervioso que apoyan, alimentan y protegen a las neuronas; también desempeñan un papel en el aprendizaje, el razonamiento y la memoria. (p. 82)
glucose the form of sugar that circulates in the blood and provides the major source of energy for body tissues. When its level is low, we feel hunger. (p. 409)	**glucosa** forma de azúcar que circula en la sangre y es la mayor fuente de energía para los tejidos del cuerpo. Cuando baja su nivel, sentimos hambre. (p. 409)
grammar in a language, a system of rules that enables us to communicate with and understand others. *Semantics* is the language's set of	**gramática** en un lenguaje específico, sistema de reglas que nos permite comunicarnos y entendernos con otros. La *semántica* es el conjunto de

rules for deriving meaning from sounds, and *syntax* is its set of rules for combining words into grammatically sensible sentences. (p. 382)	reglas del lenguaje para derivar significados a partir de sonidos, y la *sintaxis* es el conjunto de reglas para combinar palabras en oraciones gramáticamente sensibles. (p. 382)
GRIT Graduated and Reciprocated Initiatives in Tension- Reduction—a strategy designed to decrease international tensions. (p. 822)	**GRIT Iniciativas Graduadas y Recíprocas en Reducción de Tensión (Graduated and Reciprocated Initiatives in Tension-Reduction)** estrategia diseñada para reducir tensiones internacionales. (p. 822)
grit in psychology, passion and perseverance in the pursuit of long-term goals. (pp. 429, 629)	**tenacidad** en psicología, se refiere a la pasión y la perseverancia en la búsqueda de objetivos a largo plazo (pp. 429, 629)
group polarization the enhancement of a group’s prevailing inclinations through discussion within the group. (p. 787)	**efecto de polarización de grupo** solidificación y fortalecimiento de las posiciones imperantes en un grupo mediante diálogos en el grupo. (p. 787)
group therapy therapy conducted with groups rather than individuals, providing benefits from group interaction. (p. 737)	**terapia de grupo** tratamiento que se realiza con grupos en lugar de con personas individuales, y que genera beneficios de la interacción del grupo. (p. 737)
grouping the perceptual tendency to organize stimuli into coherent groups. (p. 188)	**agrupamiento** tendencia de percepción que clasifica los estímulos en grupos que tienen sentido. (p. 188)
groupthink the mode of thinking that occurs when the desire for harmony in a decision-making group overrides a realistic appraisal of alternatives. (p. 788)	**pensamiento colectivo** modo de pensar que ocurre cuando el deseo de armonía en un grupo que toma de decisiones colectivas anula la evaluación objetiva de las alternativas. (p. 788)
H	
habituation decreasing responsiveness with repeated exposure to a stimulus. (pp. 271, 491)	**aclimatación** reducir el nivel de respuesta al ser expuesto repetidamente a un estímulo. (pp. 271, 491)
hallucinations false sensory experiences, such as seeing something in the absence of an external	**alucinaciones** vivencia sensorial falsa, por ejemplo, cuando una persona ve algo sin haber ningún

visual stimulus. (pp. 233, 699)	estímulo visual externo. (pp. 233, 699)
hallucinogens psychedelic (“mind-manifesting”) drugs, such as LSD, that distort perceptions and evoke sensory images in the absence of sensory input. (p. 261)	**alucinógenos** fármacos psicodélicos (“que se manifiestan en la mente”), como el LSD, que distorsionan las percepciones y desencadenan imágenes sensoriales sin la intervención de estímulos sensoriales. (p. 261)
health psychology a subfield of psychology that provides psychology’s contribution to behavioral medicine. (p. 456)	**psicología de la salud** área de la psicología que brinda la contribución de la psicología a la medicina del comportamiento. (p. 456)
heredity the genetic transfer of characteristics from parents to offspring. (p. 129)	**herencia** transferencia genética de características, de los padres a los hijos. (p. 129)
heritability the proportion of variation among individuals in a group that we can attribute to genes. The heritability of a trait may vary, depending on the range of populations and environments studied. (pp. 135, 647)	**heredabilidad** la proporción de variación entre individuos que le podemos atribuir a los genes. La heredabilidad de un rasgo varía de acuerdo con la población y el medio ambiente. (pp. 135, 647)
heuristic a simple thinking strategy that often allows us to make judgments and solve problems efficiently; usually speedier but also more errorprone than an *algorithm*. (p. 370)	**heurística** estrategia de pensamiento sencilla que a menudo nos permite formar juicios y resolver problemas de manera eficiente; en general es más expedita que utilizar *algoritmos*, pero también hay mayor propensión a errores. (p. 370)
hierarchy of needs Maslow’s pyramid of human needs, beginning at the base with physiological needs that must first be satisfied before higher-level safety needs and then psychological needs become active. (pp. 405, 591)	**jerarquía de necesidades** la pirámide de Maslow de las necesidades humanas comienza con las necesidades fisiológicas, que deben satisfacerse antes que las necesidades de seguridad personal que son de más alto nivel. Las necesidades psicológicas son las últimas en activarse, después de satisfacer las anteriores. (pp. 405, 591)
higher-order conditioning a procedure in which the conditioned stimulus in one conditioning experience is paired with a new neutral stimulus, creating	**condicionamiento de orden superior** procedimiento donde se junta un estímulo condicionado de una experiencia de condicionamiento con un estímulo neutral,

a second (often weaker) conditioned stimulus. For example, an animal that has learned that a tone predicts food might then learn that a light predicts the tone and begin responding to the light alone. (Also called *second-order conditioning*.) (p. 276)	que crea un segundo estímulo condicionado (en general menos fuerte). Por ejemplo, un animal que ha aprendido que cierto timbre predice la llegada de comida, podría aprender también que hay una luz que predice el tono y entonces responder nada más a la luz. (También conocido como *condicionamiento de segundo orden*). (p. 276)
hindsight bias the tendency to believe, after learning an outcome, that one would have foreseen it. (Also known as the *I-knew-it-all-along phenomenon.*) (p. 38)	**distorsión retrospectiva** tendencia a creer, al enterarse de un resultado, que uno lo pudo haber previsto. (También conocido como el fenómeno de *yo ya lo sabía*). (p. 38)
hippocampus a neural center located in the limbic system; helps process for storage explicit (conscious) memories of facts and events. (pp. 106, 340)	**hipocampo** centro neuronal ubicado en el sistema límbico; ayuda a procesar recuerdos explícitos (conscientes) de hechos y eventos para almacenarlos de manera accesible. (pp. 106, 340)
histogram a bar graph depicting a frequency distribution. (p. 66)	**histograma** gráfica de barras que muestra una distribución de frecuencias. (p. 66)
homeostasis a tendency to maintain a balanced or constant internal state; the regulation of any aspect of body chemistry, such as blood glucose, around a particular level. (p. 403)	**homeostasis** tendencia a mantener un estado interno constante o equilibrado; la regulación de todos los aspectos de la química del organismo, tal como los niveles de glucosa, alrededor de un nivel particular. (p. 403)
hormones chemical messengers that are manufactured by the endocrine glands, travel through the bloodstream, and affect other tissues. (p. 95)	**hormonas** mensajeros químicos producidos por las glándulas endocrinas, que circulan por la sangre y tienen efecto en los tejidos del cuerpo. (p. 95)
hue the dimension of color that is determined by the wavelength of light; what we know as the color names *blue, green,* and so forth. (p. 177)	**tono** dimensión del color determinada por la longitud de la onda de luz; lo que conocemos como los nombres de los colores: *azul, verde*, etc. (p. 177)
human factors psychology a field of psychology allied with I/O	**psicología de factores humanos** división de la psicología relacionada con la

psychology that explores how people and machines interact and how machines and physical environments can be made safe and easy to use. (p. 24)	psicología I/O que explora la interacción entre las personas y las máquinas, y las maneras de hacer que las máquinas y los entornos físicos sean más seguros y fáciles de utilizar. (p. 24)
humanistic psychology a historically significant perspective that emphasized human growth potential. (p. 11)	**psicología humanista** perspectiva de importancia histórica que enfatiza el potencial de crecimiento de las personas. (p. 11)
humanistic theories theories that view personality with a focus on the potential for healthy personal growth. (p. 591)	**teorías humanistas** teorías que perciben a la personalidad con un enfoque sobre el potencial para un crecimiento personal saludable. (p. 591)
hypnagogic sensations bizarre experiences, such as jerking or a feeling of falling or floating weightlessly, while transitioning to sleep. (p. 233)	**sensaciones hipnagógicas** experiencias extrañas, como sacudirse o una sensación de caer o flotar de manera ligera, mientras uno transita hacia el sueño. (p. 233)
hypnosis a social interaction in which one person (the hypnotist) suggests to another (the subject) that certain perceptions, feelings, thoughts, or behaviors will spontaneously occur. (p. 225)	**hipnosis** interacción social en la cual una persona (el hipnotizador) le sugiere a otra persona (el sujeto) que ciertas percepciones, sentimientos, pensamientos o comportamientos se producirán espontáneamente. (p. 225)
hypothalamus [hi-po-THAL-uh-muss] a neural structure lying below *(hypo)* the thalamus; it directs several maintenance activities (eating, drinking, body temperature), helps govern the endocrine system via the pituitary gland, and is linked to emotion and reward. (p. 104)	**hipotálamo** estructura neuronal localizada debajo (*hipo*) del tálamo; regula actividades como comer, beber, y la temperatura del cuerpo; dirige varias actividades de mantenimiento (comer, beber, temperatura corporal); ayuda a dirigir el sistema endocrino a través de la glándula pituitaria, y está conectado a las emociones y las recompensas. (p. 104)
hypothesis a testable prediction, often implied by a theory. (p. 42)	**hipótesis** predicción comprobable, a menudo implicada por una teoría (p. 42)
I	
iconic memory a momentary sensory memory of visual stimuli; a picture-image memory lasting no more than a few tenths of a second. (p. 332)	**memoria icónica** recuerdo sensorial momentáneo de un estímulo visual; un recuerdo parecido a una fotografía que dura no más de algunas

	décimas de segundo. (p. 332)
id a reservoir of unconscious psychic energy that, according to Freud, strives to satisfy basic sexual and aggressive drives. The id operates on the *pleasure principle*, demanding immediate gratification. (p. 580)	**id** depósito de energía psíquica inconsciente que, según Freud, busca satisfacer los impulsos sexuales y agresivos esenciales. El id funciona de acuerdo al *principio del placer*, exigiendo satisfacción inmediata. (p. 580)
identical (monozygotic) twins develop from a single fertilized egg that splits in two, creating two genetically identical organisms. (p. 131)	**gemelos idénticos (monozigóticos)** se desarrollan de un solo óvulo fertilizado que se subdivide en dos para así crear dos organismos genéticamente idénticos. (p. 131)
identification the process by which, according to Freud, children incorporate their parents' values into their developing superegos. (p. 581)	**identificación** proceso en el que, según Freud, los niños incorporan los valores de sus padres en sus superegos en vías de desarrollo. (p. 581)
identity our sense of self; according to Erikson, the adolescent's task is to solidify a sense of self by testing and integrating various roles. (p. 539)	**identidad** sentido de autorreconocimiento; según Erikson, la tarea del adolescente consiste en solidificar su sentido de sí mismo probando e integrando una variedad de papeles. (p. 539)
illness anxiety disorder a disorder related to somatic symptom disorder in which a person interprets normal physical sensations as symptoms of a disease. (Formerly called *hypochondriasis*.) (p. 707)	**trastorno de ansiedad por enfermedad** trastorno relacionado con el trastorno de síntomas somáticos, donde una persona interpreta sensaciones físicas normales como síntomas de una enfermedad. (Anteriormente conocida como *hipocondriasis*). (p. 707)
illusory correlation perceiving a relationship where none exists, or perceiving a stronger-than-actual relationship. (p. 53)	**correlación ilusoria** percibir una relación donde no la hay, o percibir una relación más fuerte de la que sí existe. (p. 53)
implicit memory retention of learned skills or classically conditioned associations independent of conscious recollection. (Also called *nondeclarative memory*.) (p. 331)	**memoria implícita** retención de habilidades aprendidas o asociaciones condicionadas clásicas, sin tener consciencia del aprendizaje. (También se le dice *memoria no declarativa*). (p. 331)
imprinting	**impronta**

the process by which certain animals form strong attachments during early life. (p. 510)	proceso mediante el cual ciertos animales forman lazos fuertes desde el inicio de sus vidas. (p. 510)
inattentional blindness failing to see visible objects when our attention is directed elsewhere. (p. 160)	**ceguera por falta de atención** incapacidad para ver objetos visibles cuando nuestra atención se dirige a otra parte. (p. 160)
incentive a positive or negative environmental stimulus that motivates behavior. (p. 403)	**incentivo** estímulo positivo o negativo del entorno que motiva el comportamiento. (p. 403)
independent variable in an experiment, the factor that is manipulated; the variable whose effect is being studied. (p. 55)	**variable independiente** factor que se manipula en un experimento; la variable cuyo efecto es el objeto de estudio. (p. 55)
individualism giving priority to one's own goals over group goals and defining one's identity in terms of personal attributes rather than group identifications. (p. 616)	**individualismo** priorizar las metas personales sobre las metas del grupo, y definir la identidad propia a través de cualidades personales y no por la identificación del grupo. (p. 616)
industrial-organizational (I/O) psychology the application of psychological concepts and methods to optimizing human behavior in workplaces. (p. 24)	**psicología industrial y organizacional (I/O)** aplicación de conceptos y métodos psicológicos al comportamiento humano en el entorno laboral. (p. 24)
inferential statistics numerical data that allow one to generalize —to infer from sample data the probability of something being true of a population. (p. 70)	**estadística inferencial** datos numéricos que permiten generalizar — o inferir a partir de los datos de una muestra — la probabilidad de que algo sea verdadero dentro de una población. (p. 70)
informational social influence influence resulting from one's willingness to accept others' opinions about reality. (p. 778)	**influencia social informativa** influencia resultante de la disposición de una persona a aceptar las opiniones de otros acerca de la realidad. (p. 778)
informed consent giving potential participants enough information about a study to enable them to choose whether they wish to participate. (p. 62)	**consentimiento informado** dar a las personas información suficiente sobre un estudio para permitirles decidir si desean o no participar. (p. 62)
ingroup	**endogrupo**

“us”—people with whom we share a common identity. (p. 796)	“nosotros”; personas con quienes uno comparte una identidad común. (p. 796)
ingroup bias the tendency to favor our own group. (p. 796)	**estereotipo de grupo propio** tendencia a favorecer al grupo al que se pertenece. (p. 796)
inner ear the innermost part of the ear, containing the cochlea, semicircular canals, and vestibular sacs. (p. 199)	**oído interno** parte más interna del oído; contiene la cóclea, los canales semicirculares y los sacos vestibulares. (p. 199)
insecure attachment demonstrated by infants who display either a clinging, *anxious attachment* or an *avoidant attachment* that resists closeness. (p. 511)	**apego inseguro** comportamiento de infantes muestran un *apego ansioso* aferrado o un *apego evasivo* que evita la cercanía. (p. 511)
insight a sudden realization of a problem’s solution; contrasts with strategy-based solutions. (pp. 304, 370)	**agudeza** entendimiento repentino de cómo se resuelve un problema; contrasta con las soluciones basadas en estrategias. (pp. 304, 370)
insight therapies therapies that aim to improve psychological functioning by increasing a person’s awareness of underlying motives and defenses. (p. 725)	**tratamientos con agudeza** terapias que aspiran a mejorar el funcionamiento psicológico mediante el aumento en la conciencia de la persona de los motivos y las defensas subyacentes. (p. 725)
insomnia recurring problems in falling or staying asleep. (p. 244)	**insomnio** dificultades recurrentes para quedarse dormido o conciliar el sueño. (p. 244)
instinct a complex behavior that is rigidly patterned throughout a species and is unlearned. (p. 402)	**instinto** comportamiento complejo rígidamente arraigado a una especie y que no es aprendido. (p. 402)
instinctive drift the tendency of learned behavior to gradually revert to biologically predisposed patterns. (p. 303)	**deriva instintiva** tendencia de los aprendizajes aprendidos a revertirse gradualmente a patrones biológicos predispuestos. (p. 303)
intellectual disability a condition of limited mental ability, indicated by an intelligence test score of 70 or below and difficulty adapting to the	**discapacidad intelectual** estado de capacidad mental limitada, que se expresa a través de una puntuación de prueba de inteligencia de 70 o menos y de la

demands of life. (Formerly referred to as *mental retardation.*) (p. 644)	dificultad para adaptarse a las exigencias de la vida. (Anteriormente conocida como *retraso mental*). (p. 644)
intelligence quotient (IQ) defined originally as the ratio of mental age (*ma*) to chronological age (*ca*) multiplied by 100 (thus, $\text{IQ} = ma/ca \times 100$). On contemporary intelligence tests, the average performance for a given age is assigned a score of 100. (p. 634)	**coeficiente intelectual (CI)** cifra definida originalmente como la edad mental (*em*) dividida entre la edad cronológica (*ec*) y el resultado multiplicado por 100 (por lo tanto, $\text{CI} = em/ec \times 100$). En las pruebas actuales de inteligencia, al desempeño promedio en una prueba de inteligencia se le asigna un puntaje de 100.
intelligence test a method for assessing an individual’s mental aptitudes and comparing them with those of others, using numerical scores. (p. 632)	**prueba de inteligencia** método para evaluar las aptitudes mentales de los individuos y compararlas con las de otros a través de puntajes numéricos. (p. 632)
intelligence the ability to learn from experience, solve problems, and use knowledge to adapt to new situations. (p. 626)	**inteligencia** capacidad de aprender de las experiencias, de resolver problemas y de utilizar el conocimiento para adaptarse a situaciones nuevas. (p. 626)
intensity the amount of energy in a light wave or sound wave, which influences what we perceive as brightness or loudness. Intensity is determined by the wave’s amplitude (height). (p. 177)	**intensidad** cantidad de energía en una onda de luz o en una onda sonora que percibimos como brillo o volumen. La intensidad la determina la amplitud (altura) de la onda. (p. 177)
interaction the interplay that occurs when the effect of one factor (such as environment) depends on another factor (such as heredity). (p. 137)	**interacción** la situación que se produce cuando el efecto de un factor (por ejemplo, el entorno) depende de otro factor (por ejemplo, la herencia). (p. 137)
internal locus of control the perception that we control our own fate. (p. 309)	**foco de control interno** impresión de que controlamos nuestro propio destino. (p. 309)
interneurons neurons within the brain and spinal cord; they communicate internally and process information between the sensory inputs and motor outputs. (p. 93)	**interneuronas** neuronas ubicadas dentro del cerebro y la médula espinal. Se comunican internamente y procesan la información entre los estímulos sensoriales y las respuestas motoras. (p. 93)

interpretation in psychoanalysis, the analyst’s noting supposed dream meanings, resistances, and other significant behaviors and events in order to promote insight. (p. 723)	**interpretación** en psicoanálisis, las observaciones del analista con relación al significado de los sueños, las resistencias, y otras conductas y eventos significativos, a fin de promover la sagacidad. (p. 723)
intersex a condition present at birth due to unusual combinations of male and female chromosomes, hormones, and anatomy; possessing biological sexual characteristics of both sexes. (p. 547)	**intersexo** condición al momento del nacimiento en la que el recién nacido presenta características sexuales biológicas de ambos sexos. (p. 547)
intimacy in Erikson’s theory, the ability to form close, loving relationships; a primary developmental task in young adulthood. (p. 540)	**intimidad** según la teoría de Erikson, la capacidad de formar relaciones amorosas cercanas; una de las principales funciones de desarrollo en la adultez temprana. (p. 540)
intrinsic motivation a desire to perform a behavior effectively for its own sake. (p. 305)	**motivación intrínseca** deseo de realizar una conducta de manera adecuada simplemente por la mera satisfacción de hacerlo bien. (p. 305)
introspection the process of looking inward in an attempt to directly observe one’s own psychological processes. (p. 8)	**introspección** el proceso de mirar hacia adentro para tratar de observar los procesos psicológicos propios. (p. 8)
intuition an effortless, immediate, automatic feeling or thought, as contrasted with explicit, conscious reasoning. (p. 372)	**intuición** sentimiento o pensamiento automático e inmediato, que no precisa esfuerzo alguno, que se contrasta con el razonamiento explícito y consciente. (p. 372)
iris a ring of muscle tissue that forms the colored portion of the eye around the pupil and controls the size of the pupil opening. (p. 177)	**iris** tejido musculoso en forma de aro que forma la sección colorida de los ojos alrededor de la pupila y controla el tamaño de la apertura de la pupila. (p. 177)
J	
James-Lange theory the theory that our experience of emotion is our awareness of our physiological responses to an emotion-arousing stimulus: stimulus S	**teoría de James-Lange** teoría según la cual nuestra experiencia de la emoción es nuestro conocimiento de nuestras respuestas fisiológicas a estímulos que

arousal S emotion. (p. 433)	despiertan emociones: estímulo S respuesta S emoción. (p. 433)
just-world phenomenon the tendency for people to believe the world is just and that people therefore get what they deserve and deserve what they get. (p. 796)	**fenómeno del “mundo justo”** tendencia a creer que el mundo es justo y que por tanto, las personas obtienen lo que se merecen y se merecen lo que obtienen. (p. 796)
K	
kinesthesia [kin-ehs-THEE-zhuh] our movement sense—our system for sensing the position and movement of individual body arts. (p. 213)	**cinestesia** nuestro sentido del movimiento; nuestro sistema para sentir la posición y movimiento de partes individuales del cuerpo. (p. 213)
L	
language our spoken, written, or signed words and the ways we combine them to communicate meaning. (p. 381)	**lenguaje** palabras habladas, escritas o en señas y las maneras que se combinan para comunicar significado. (p. 381)
latent content according to Freud, the underlying meaning of a dream (as distinct from its manifest content). (p. 248)	**contenido latente** según Freud, significado subyacente de un sueño (a diferencia de su contenido manifiesto). (p. 248)
latent learning learning that occurs but is not apparent until there is an incentive to demonstrate it. (p. 304)	**aprendizaje latente** aprendizaje que no es aparente sino hasta que hay un incentivo para demostrarlo. (p. 304)
law of effect Thorndike’s principle that behaviors followed by favorable consequences become more likely, and that behaviors followed by unfavorable consequences become less likely. (p. 283)	**ley de efecto** principio propuesto por Thorndike en el que se propone que las conductas seguidas por consecuencias favorables se vuelven más comunes, mientras que las conductas seguidas por consecuencias desfavorables se repiten con menor frecuencia. (p. 283)
learned helplessness the hopelessness and passive resignation an animal or person learns when unable to avoid repeated aversive events. (p. 307)	**indefensión aprendida** desesperación y resignación pasiva que un animal o persona desarrollan cuando son incapaces de evitar eventos repetidos que generan aversión. (p. 307)

learning the process of acquiring through experience new and relatively enduring information or behaviors. (p. 270)	**aprendizaje** proceso de adquirir, mediante la experiencia información o conductas nuevas y relativamente permanentes. (p. 270)
lens the transparent structure behind the pupil that changes shape to help focus images on the retina. (p. 177)	**lente** estructura transparente ubicada detrás de la pupila que cambia de forma para ayudar a enfocar imágenes en la retina. (p. 177)
lesion [LEE-zhuhn] tissue destruction. A brain lesion is a naturally or experimentally caused destruction of brain tissue. (p. 98)	**lesión** destrucción de tejido. Las lesiones cerebrales generalmente son el resultado de destrucción del tejido cerebral. (p. 98)
limbic system neural system (including the *amygdala, hypothalamus*, and *hippocampus*) located below the cerebral hemispheres; associated with emotions and drives. (p. 104)	**sistema límbico** sistema de neuronas (incluye la *amígdala*, el *hipotálamo* y el *hipocampo*), ubicado debajo de los hemisferios cerebrales; se lo asocia con las emociones y los impulsos. (p. 104)
linguistic determinism the strong form of Whorf's hypothesis—that language controls the way we think and interpret the world around us. (p. 389)	**determinismo lingüístico** versión fuerte de la hipótesis de Whorf; que el lenguaje controla cómo pensamos e interpretamos el mundo que nos rodea. (p. 389)
linguistic influence the weaker form of "linguistic relativity"—the idea that language *affects* thought (thus our thinking and world view is "relative to" our cultural language). (p. 389)	**influencia lingüística** la versión débil de la "relatividad lingüística"; la idea de que el lenguaje *afecta* al pensamiento (y por tanto nuestro pensamiento y perspectiva del mundo es "relativo" a nuestro lenguaje cultural). (p. 389)
lobotomy a psychosurgical procedure once used to calm uncontrollably emotional or violent patients. The procedure cut the nerves connecting the frontal lobes to the emotion-controlling centers of the inner brain. (p. 758)	**lobotomía** procedimiento psicoquirúrgico que otrora se usó para calmar a pacientes emocionalmente incontrolables o violentos. En el procedimiento se cortaban los nervios entre los lóbulos frontales y los centros en el interior del cerebro que controlan las emociones. (p. 758)
long-term memory the relatively permanent and limitless storehouse of the memory system. Includes knowledge, skills, and experiences. (p. 329)	**memoria de largo plazo** el almacenamiento relativamente permanente e ilimitado del sistema de memoria. Incluye conocimientos, habilidades y experiencias.

	(p. 329)
long-term potentiation (LTP) an increase in a cell’s firing potential after brief, rapid stimulation; a neural basis for learning and memory. (p. 342)	**potenciación a largo plazo (PLP)** aumento en la eficacia de una célula para transmitir impulsos sinápticos. Se considera la base neuronal del aprendizaje y la memoria. (p. 342)
longitudinal study research that follows and retests the same people over time. (pp. 563, 640)	**estudio longitudinal** investigación en la que las mismas personas se estudian una y otra vez durante un lapso de tiempo prolongado. (pp. 563, 640)
LSD a powerful hallucinogenic drug; also known as acid *(lysergic acid diethylamide)*. (p. 262)	**LSD/ácido lisérgico** poderoso fármaco alucinógeno; también se conoce como ácido (dietilamida de ácido lisérgico). (p. 262)
M	
major depressive disorder a disorder in which a person experiences, in the absence of drugs or another medical condition, two or more weeks with five or more symptoms, at least one of which must be either (1) depressed mood or (2) loss of interest or pleasure. (p. 687)	**trastorno depresivo mayor** trastorno en el cual una persona —sin padecer alguna afección médica y sin usar drogas— pasa dos o más semanas con cinco o más síntomas, de los cuales al menos uno tiene que ser ya sea (1) un estado de ánimo deprimido o (2) la pérdida de interés o placer. (p. 687)
mania a hyperactive, wildly optimistic state in which dangerously poor judgment is common. (p. 687)	**manía** estado de ánimo marcado por un estado de hiperactividad y optimismo desenfrenado, caracterizado por la falta de juicio. (p. 687)
manifest content according to Freud, the symbolic, remembered story line of a dream (as distinct from its latent, or hidden, content). (p. 248)	**contenido manifiesto** según Freud, trama del sueño que se recuerda al despertarse (a diferencia del contenido latente o contenido oculto). (p. 248)
maturation biological growth processes that enable orderly changes in behavior, relatively uninfluenced by experience. (p. 494)	**maduración** procesos de crecimiento biológico que casi siempre conducen a cambios ordenados en el comportamiento y son independientes de la experiencia. (p. 494)
mean the arithmetic average of a distribution,	**promedio** media aritmética de una distribución que se

obtained by adding the scores and then dividing by the number of scores. (p. 67)	obtiene sumando las puntuaciones y luego dividiendo el total entre el número de puntuaciones. (p. 67)
median the middle score in a distribution; half the scores are above it and half are below it. (p. 67)	**media** puntuación central de una distribución; la mitad de las puntuaciones se encuentran por encima y la mitad se encuentran por debajo de la media. (p. 67)
medical model the concept that diseases, in this case psychological disorders, have physical causes that can be *diagnosed*, *treated*, and, in most cases, *cured*, often through treatment in a *hospital*. (p. 667)	**modelo médico** concepto que afirma que las enfermedades, en este caso los trastornos psicológicos, tienen causas físicas que se pueden *diagnosticar*, *tratar* y, en la mayoría de los casos, *curar*, generalmente por medio de tratamientos que se llevan a cabo en un *hospital*. (p. 667)
medulla [muh-DUL-uh] the base of the brainstem; controls heartbeat and breathing. (p. 102)	**médula** base del tronco encefálico; controla la frecuencia cardíaca y la respiración. (p. 102)
MEG (magnetoencephalography) a brain imaging technique that measures magnetic fields from the brain’s natural electrical activity. (p. 99)	**MEG (magnetoencefalografía)** técnica para tomar imágenes del cerebro que mide los campos magnéticos de la actividad eléctrica natural del cerebro. (p. 99)
memory consolidation the neural storage of a long-term memory. (p. 340)	**consolidación de la memoria** almacenaje neural de la memoria a largo plazo. (p. 340)
memory the persistence of learning over time through the encoding, storage, and retrieval of information. (p. 326)	**memoria** aprender de manera persistente a través del tiempo usando la codificación, el almacenaje y la recuperación de la información. (p. 326)
menarche [meh-NAR-key] the first menstrual period. (p. 547)	**menarquía** primer periodo menstrual. (p. 547)
menopause the time of natural cessation of menstruation; also refers to the biological changes a woman experiences as her ability to reproduce declines. (p. 558)	**menopausia** el momento del cese natural de la menstruación; también se refiere a los cambios biológicos que experimentan las mujeres cuando disminuye su capacidad reproductiva. (p. 558)

mental age a measure of intelligence test performance devised by Binet; the level of performance typically associated with children of a certain chronological age. Thus, a child who does as well as an average 8-year-old is said to have a mental age of 8. (p. 633)	**edad mental** medida de desempeño en la prueba de inteligencia diseñada por Binet. La edad cronológica del niño que corresponde característicamente a un nivel dado de desempeño. Por ende, se dice que un niño que se desempeña como una persona normal de 8 años, tiene una edad mental de 8 años. (p. 633)
mental set a tendency to approach a problem in one particular way, often a way that has been successful in the past. (p. 371)	**mentalidad** tendencia a abordar los problemas de una manera particular, con frecuencia, una manera que ha funcionado anteriormente. (p. 371)
mere exposure effect the phenomenon that repeated exposure to novel stimuli increases liking of them. (p. 808)	**efecto de la mera exposición** fenómeno que sostiene que la exposición repetida a estímulos novedosos aumenta la atracción a tales estímulos. (p. 808)
meta-analysis a procedure for statistically combining the results of many different research studies. (p. 743)	**meta-análisis** procedimiento para combinar estadísticamente los resultados de muchas investigaciones diferentes. (p. 743)
methamphetamine a powerfully addictive drug that stimulates the central nervous system, with accelerated body functions and associated energy and mood changes; over time, appears to reduce baseline dopamine levels. (p. 260)	**metanfetamina** fármaco poderosamente adictivo que estimula el sistema nervioso central con funciones corporales aceleradas y los cambios correspondientes de la energía y el estado de ánimo. Con el tiempo, parece reducir los niveles de referencia de dopamina. (p. 260)
middle ear the chamber between the eardrum and cochlea containing three tiny bones (hammer, anvil, and stirrup) that concentrate the vibrations of the eardrum on the cochlea’s oval window. (p. 199)	**oído medio** cámara ubicada entre el tímpano y la cóclea; contiene tres huesos pequeños (el martillo, el yunque y el estribo) que concentran las vibraciones del tímpano y de la ventana oval de la cóclea. (p. 199)
mindfulness meditation a reflective practice in which people attend to current experiences in a nonjudgmental and accepting manner. (p. 470)	**meditación a conciencia plena** práctica reflexiva en la que las personas atienden a las vivencias del momento de una manera tolerante y no condenatoria. (p. 470)
Minnesota Multiphasic Personality	**Inventario de Personalidad Polifacética de**

Inventory (MMPI) the most widely researched and clinically used of all personality tests. Originally developed to identify emotional disorders (still considered its most appropriate use), this test is now used for many other screening purposes. (p. 598)	**Minnesota (IPPM)** prueba de personalidad más ampliamente investigada y utilizada de todas las pruebas. Creada originalmente para identificar trastornos emocionales (y todavía se la utiliza con tal fin), esta prueba se utiliza en la actualidad para muchas actividades de preselección. (p. 598)
mirror neurons frontal lobe neurons that some scientists believe fire when we perform certain actions or observe another doing so. The brain's mirroring of another's action may enable imitation and empathy. (p. 313)	**neuronas espejo** neuronas del lóbulo frontal que, según algunos científicos, se disparan cuando llevamos a cabo ciertas acciones o cuando vemos que las hace alguien más. Esta forma del cerebro de reflejar las acciones de otros posiblemente habilite la imitación y la empatía. (p. 313)
mirror-image perceptions mutual views often held by conflicting people, as when each side sees itself as ethical and peaceful and views the other side as evil and aggressive. (p. 820)	**percepciones idénticas** opiniones mutuas que generalmente sostienen las personas que discrepan o experimentan conflictos entre sí, como cuando cada parte se ve a sí misma como ética y pacifica, y a la otra parte la ve como malvada y agresiva. (p. 820)
misinformation effect occurs when misleading information has distorted one's memory of an event. (p. 357)	**efecto de información errónea** recuerdo que se deforma al recibir información engañosa. (p. 357)
mnemonics [nih-MON-iks] memory aids, especially those techniques that use vivid imagery and organizational devices. (p. 333)	**nemotecnia** apoyos memorísticos, sobre todo técnicas que utilizan imágenes brillantes y dispositivos organizacionales. (p. 333)
mode the most frequently occurring score(s) in a distribution. (p. 67)	**moda** puntuación o puntuaciones que ocurren con mayor frecuencia en una distribución. (p. 67)
modeling the process of observing and imitating a specific behavior. (p. 312)	**modelar** proceso de observar e imitar un comportamiento en particular. (p. 312)
molecular behavior genetics the study of how the structure and function of genes interact with our environment to influence behavior. (p. 137)	**genética del comportamiento molecular** el estudio de cómo la estructura y la función de los genes interactúa con nuestro entorno para influir en nuestro comportamiento. (p. 137)

molecular genetics the subfield of biology that studies the molecular structure and function of genes. (p. 137)	**genética molecular** área de la biología que estudia la estructura molecular y la función de los genes. (p. 137)
monocular cue a depth cue, such as interposition or linear perspective, available to either eye alone. (p. 190)	**indicación monocular** señal de profundidad como la interposición y la perspectiva lineal, que se puede percibir con un ojo a la vez. (p. 190)
mood-congruent memory the tendency to recall experiences that are consistent with one’s current good or bad mood. (p. 346)	**memoria congruente con el estado de ánimo** tendencia a recordar experiencias que concuerdan con el buen o mal estado de ánimo que estamos viviendo. (p. 346)
morpheme in a language, the smallest unit that carries meaning; may be a word or a part of a word (such as a prefix). (p. 382)	**morfema** en un lenguaje, la unidad más pequeña que lleva significado; puede ser una palabra o parte de una palabra (por ejemplo, un prefijo). (p. 382)
motivation a need or desire that energizes and directs behavior. (p. 402)	**motivación** necesidad o deseo que promueve y dirige el comportamiento. (p. 402)
motor (efferent) neurons neurons that carry outgoing information from the brain and spinal cord to the muscles and glands. (p. 93)	**neurona motriz (eferente)** neurona que lleva la información desde el cerebro y la médula espinal hacia los músculos y las glándulas. (p. 93)
motor cortex an area at the rear of the frontal lobes that controls voluntary movements. (p. 110)	**corteza motora** parte de la corteza cerebral en la parte posterior de los lóbulos frontales. Controla los movimientos voluntarios. (p. 110)
MRI (magnetic resonance imaging) a technique that uses magnetic fields and radio waves to produce computer-generated images of soft tissue. MRI scans show brain anatomy. (p. 99)	**imagen de resonancia magnética (IRM)** técnica que emplea campos magnéticos y ondas de radio para producir imágenes computarizadas de tejidos blandos. Las imágenes de IRM nos permiten visualizar la anatomía del cerebro. (p. 99)
mutation a random error in gene replication that leads to a change. (p. 142)	**mutación** error aleatorio en la replicación de los genes que provoca a un cambio. (p. 142)

myelin [MY-uh-lin] **sheath** a fatty tissue layer segmentally encasing the axons of some neurons; enables vastly greater transmission speed as neural impulses hop from one node to the next. (p. 82)	**funda de mielina** tejido adiposo que cubre los axones de algunas neuronas; habilita velocidades de transmisión más alta para enviar impulsos neurales de un nodo al siguiente. (p. 82)

N

narcissism excessive self-love and self-absorption. (pp. 427, 615)	**narcisismo** amor propio y ensimismamiento excesivos. (pp. 427, 615)
narcolepsy a sleep disorder characterized by uncontrollable sleep attacks. The sufferer may lapse directly into REM sleep, often at inopportune times. (p. 245)	**narcolepsia** trastorno caracterizado por ataques incontrolables de sueño. Las personas con narcolepsia caen directamente en el sueño MOR incluso en momentos inoportunos. (p. 245)
natural selection the principle that inherited traits that better enable an organism to survive and reproduce in a particular environment will (in competition with other trait variations) most likely be passed on to succeeding generations. (pp. 14, 141)	**selección natural** principio según el cual los rasgos heredados que más ayudan a un organismo a sobrevivir en cierto entorno, serán (en competencia con otras variaciones) las que más probablemente se transmitan a las generaciones futuras. (pp. 14, 141)
naturalistic observation a descriptive technique of observing and recording behavior in naturally occurring situations without trying to manipulate or control the situation. (p. 45)	**observación naturalista** técnica descriptiva de observar y registrar la conducta en situaciones reales sin tratar de manipular ni controlar la situación. (p. 45)
nature–nurture issue the longstanding controversy over the relative contributions that genes and experience make to the development of psychological traits and behaviors. Today’s science sees traits and behaviors arising from the interaction of nature and nurture. (p. 14)	**debate de naturaleza–crianza** controversia de antaño acerca del aporte relativo que ejercen los genes y las vivencias en el desarrollo de los rasgos y comportamientos psicológicos. En la ciencia psicológica actual se opina que los rasgos y comportamientos tienen origen en la interrelación entre la naturaleza y la crianza. (p. 14)
near-death experience an altered state of consciousness reported after a close brush with death (such as cardiac arrest); often similar to drug-induced	**experiencia al borde de la muerte** estado de alteración de la consciencia experimentado por personas que tienen un encuentro cercano con la muerte (por

hallucinations. (p. 262)	ejemplo, cuando se sufre un paro cardíaco). A menudo es similar a las alucinaciones inducidas por los estupefacientes. (p. 262)
negative reinforcement increasing behaviors by stopping or reducing aversive stimuli. A negative reinforcer is any stimulus that, when *removed* after a response, strengthens the response. (*Note:* Negative reinforcement is not punishment.) (p. 285)	**reforzamiento negativo** aumento en la expresión de comportamientos mediante la interrupción o reducción de los estímulos negativos. Un reforzamiento negativo es todo aquello que, cuando se elimina después de una reacción, refuerza la reacción. (*Nota*: el reforzamiento negativo no significa castigo). (p. 285)
nerves bundled axons that form neural cables connecting the central nervous system with muscles, glands, and sense organs. (p. 92)	**nervios** conjuntos de axones neuronales que forman “cables” de nervios y conectan el sistema nervioso central con los músculos, las glándulas y los órganos sensoriales. (p. 92)
nervous system the body’s speedy, electrochemical communication network, consisting of all the nerve cells of the peripheral and central nervous systems. (p. 91)	**sistema nervioso** veloz red electroquímica de comunicación del cuerpo que consta de todas las células nerviosas del sistema nervioso central y periférico. (p. 91)
neurocognitive disorders (NCDs) acquired (not lifelong) disorders marked by cognitive deficits; often related to Alzheimer’s disease, brain injury or disease, or substance abuse. In older adults, neurocognitive disorders were formerly called *dementia*. (p. 563)	**trastornos neurocognitivos (TNC)** trastornos adquiridos (no de por vida) marcados por déficits cognitivos; con frecuencia se les relaciona con la enfermedad de Alzheimer, lesiones o enfermedades cerebrales o abuso de sustancias. Anteriormente se conocía a los trastornos neurocognitivos en adultos mayores como *demencia*. (p. 563)
neurogenesis the formation of new neurons. (p. 117)	**neurogénesis** formación de neuronas nuevas. (p. 117)
neuron a nerve cell; the basic building block of the nervous system. (p. 81)	**neurona** célula nerviosa; componente básico del sistema nervioso. (p. 81)
neurotransmitters chemical messengers that cross the synaptic gaps between neurons. When released by the sending neuron, neurotransmitters travel across the synapse and bind to receptor sites on the receiving neuron, thereby influencing	**neurotransmisores** mensajeros químicos que cruzan las sinapsis entre neuronas. Al ser liberados por la neurona, los neurotransmisores cruzan la sinapsis y se adhieren al sitio receptor de la neurona que los recibe y con ello influyen en

whether that neuron will generate a neural impulse. (p. 85)	si esa neurona generará un impulso neural. (p. 85)
neutral stimulus (NS) in classical conditioning, a stimulus that elicits no response before conditioning. (p. 273)	**estímulos neutrales (EN)** según el condicionamiento clásico, un estímulo que no produce respuesta antes del condicionamiento. (p. 273)
nicotine a stimulating and highly addictive psychoactive drug in tobacco. (p. 258)	**nicotina** fármaco estimulante, altamente adictivo y psicoactivo que se halla en el tabaco. (p. 258)
night terrors a sleep disorder characterized by high arousal and an appearance of being terrified; unlike nightmares, night terrors occur during NREM-3 sleep, within two or three hours of falling asleep, and are seldom remembered. (p. 246)	**terror nocturno** trastorno del sueño caracterizado por agitación y la apariencia de estar asustado; a diferencia de las pesadillas, los terrores nocturnos ocurren durante el sueño NMOR-3, dentro de dos o tres horas de quedarse dormido y rara vez son recordados. (p. 246)
normal curve (*normal distribution*) a symmetrical, bell-shaped curve that describes the distribution of many types of data; most scores fall near the mean (about 68 percent fall within one standard deviation of it) and fewer and fewer near the extremes. (pp. 68, 635)	**curva normal** (*distribución normal*) curva asimétrica en forma de campana que describe la distribución de muchos tipos de datos; la mayoría de los puntajes caen cerca de la media (cerca del 68 por ciento caen dentro de una desviación estándar de uno de la media) y hay cada vez menos cerca de los extremos. (pp. 68, 635)
normative social influence influence resulting from a person's desire to gain approval or avoid disapproval. (p. 777)	**influencia social normativa** influencia resultante del deseo de una persona de obtener la aprobación o evitar la desaprobación de los demás. (p. 777)
norms understood rules for accepted and expected behavior. Norms prescribe "proper" behavior. (p. 775)	**normas** reglas sobre el comportamiento aceptado y esperado. Las normas describen el comportamiento "apropiado". (p. 775)
NREM sleep non-rapid eye movement sleep; encompasses all sleep stages except for REM sleep. (p. 233)	**sueño NMOR** sueño sin movimiento ocular rápido; incluye todas las fases del sueño excepto el sueño MOR. (p. 233)
O	

obesity defined as a body mass index (BMI) measurement of 30 or higher. (Overweight individuals have a BMI of 25 or higher.) (p. 414)	**obesidad** se define como una medida de índice de masa corporal, (IMC) de 30 o más. (Los individuos con soprepeso tienen medidas de 25 o más). (p. 414)
object permanence the awareness that things continue to exist even when not perceived. (p. 499)	**permanencia de los objetos** reconocimiento de que las cosas siguen existiendo aunque no las veamos. (p. 499)
observational learning learning by observing others. (Also called *social learning*.) (p. 312)	**aprendizaje observacional** aprender observando a los demás. (También conocido como *aprendizaje social*.) (p. 312)
obsessive-compulsive disorder (OCD) a disorder characterized by unwanted repetitive thoughts (obsessions), actions (compulsions), or both. (p. 679)	**trastorno obsesivo-compulsivo (TOC)** trastorno que se caracteriza por pensamientos (obsesiones) y/o acciones (compulsiones) repetitivos y no deseados o ambos. (p. 679)
occipital [ahk-SIP-uh-tuhl] **lobes** the portion of the cerebral cortex lying at the back of the head; includes areas that receive information from the visual fields. (p. 110)	**lóbulos occipitales** sección de la corteza cerebral ubicada en la parte posterior de la cabeza; incluye las áreas que reciben información de los campos visuales. (p. 110)
Oedipus [ED-uh-puss] **complex** according to Freud, a boy's sexual desires toward his mother and feelings of jealousy and hatred for the rival father. (p. 580)	**complejo de Edipo** según Freud, los deseos sexuales de un niño hacia su madre y sentimientos de celos y odio hacia el padre rival. (p. 580)
olfaction the sense of smell. (p. 211)	**olfato** sentido del olor. (p. 211)
one-word stage the stage in speech development, from about age 1 to 2, during which a child speaks mostly in single words. (p. 384)	**etapa holofrástica** etapa en el desarrollo del habla, entre el primer y segundo año en la que el niño se expresa principalmente con palabras aisladas. (p. 384)
operant behavior behavior that operates on the environment, producing consequences. (p. 271)	**comportamiento operante** comportamiento que opera en el entorno, produciendo consecuencias. (p. 271)
operant chamber in operant conditioning research, a chamber (also known as a *Skinner box*) containing a	**cámara operante** Caja (también conocida como *cámara de Skinner*) que contiene una barra o tecla que

bar or key that an animal can manipulate to obtain a food or water reinforcer; attached devices record the animal’s rate of bar pressing or key pecking. (p. 284)	un animal puede manipular para obtener un reforzamiento de comida o agua; con una serie de dispositivos conectados se graba la cantidad de veces que el animal presiona la barra. (p. 284)
operant conditioning a type of learning in which a behavior becomes more likely to recur if followed by a reinforcer or less likely to recur if followed by a punisher. (p. 283)	**condicionamiento operante** aprendizaje en el que el comportamiento se torna más probable si es seguido por un reforzamiento o se atenúa si es seguido por un castigo. (p. 283)
operational definition a carefully worded statement of the exact procedures (operations) used in a research study. For example, *human intelligence* may be operationally defined as what an intelligence test measures. (p. 42)	**definición operacional** declaración redactada con gran cuidado en la que se detallan los procedimientos (operaciones) exactos que se usan en un estudio de investigación. Por ejemplo, la *inteligencia humana* puede ser operacionalmente definida como lo que se mide en una prueba de inteligencia. (p. 42)
opiates opium and its derivatives, such as morphine and heroin; depress neural activity, temporarily lessening pain and anxiety. (p. 257)	**opioides** el opio y sus derivados, tales como la morfina y la heroína; deprimen la actividad neuronal y alivian temporalmente el dolor y la ansiedad. (p. 257)
opponent-process theory the theory that opposing retinal processes (red-green, blue-yellow, white-black) enable color vision. For example, some cells are stimulated by green and inhibited by red; others are stimulated by red and inhibited by green. (p. 182)	**teoría de proceso de oponentes** Teoría que manifiesta que los procesos opuestos de la retina (rojo-verde, amarillo-azul, blanco-negro) posibilitan la visualización de los colores. Por ejemplo, algunas células se estimulan con el verde y se inhiben con el rojo; otras se estimulan con el rojo y se inhiben con el verde. (p. 182)
optic nerve the nerve that carries neural impulses from the eye to the brain. (p. 178)	**nervio óptico** nervio que transporta los impulsos neuronales del ojo al cerebro. (p. 178)
ostracism deliberate social exclusion of individuals or groups. (p. 425)	**ostracismo** exclusión social deliberada de individuos o grupos. (p. 425)
other-race effect the tendency to recall faces of one’s own race more accurately than faces of other	**efecto de otras razas** tendencia a recordar caras de la raza de uno mismo con mayor precisión que las caras de

races. Also called the *cross-race effect* and the *own-race bias*. (p. 797)	otras razas. También se conoce como *efecto de raza cruzada* o *sesgo de rasa propia*. (p. 797)
outgroup “them”—those perceived as different or apart from our ingroup. (p. 796)	**grupo ajeno** “ellos”, o, las personas a las que percibimos como distintas o separadas, que no forman parte de nuestro grupo. (p. 796)
overconfidence the tendency to be more confident than correct—to overestimate the accuracy of our beliefs and judgments. (p. 375)	**exceso de confianza** tendencia a ser más confiado que acertado, o sea, a sobreestimar las creencias y las opiniones propias. (p. 375)
P	
panic disorder an anxiety disorder marked by unpredictable, minuteslong episodes of intense dread in which a person may experience terror and accompanying chest pain, choking, or other frightening sensations; often followed by worry over a possible next attack. (p. 678)	**trastorno de pánico** trastorno de ansiedad marcado por el inicio repentino y recurrente de episodios impredecibles de aprehensión intensa o terror que pueden durar varios minutos, en los cuales la persona puede sentir dolor de pecho, sofocamiento, y otras sensaciones atemorizantes; a menudo la preocupación es por la posibilidad de un posible nuevo ataque. (p. 678)
parallel processing processing many aspects of a problem simultaneously; the brain’s natural mode of information processing for many functions. (pp. 126, 183, 329)	**procesamiento en paralelo** procesamiento simultáneo de muchos aspectos de un problema o escena; es la forma natural del cerebro de procesar muchas funciones. (pp. 126, 183, 329)
parapsychology the study of paranormal phenomena, including ESP and psychokinesis. (p. 172)	**parapsicología** el estudio de fenómenos paranormales, entre ellos percepción extrasensorial y telequinesis. (p. 172)
parasympathetic nervous system the division of the autonomic nervous system that calms the body, conserving its energy. (p. 93)	**sistema nervioso autonómico parasimpático** subdivisión del sistema nervioso autonómico que calma el cuerpo y conserva su energía. (p. 93)
parietal [puh-RYE-uh-tuhl] **lobes** the portion of the cerebral cortex lying at the top of the head and toward the rear; receives sensory input for touch and body position.	**lóbulos parietales** región de la corteza cerebral en la parte superior y hacia la parte posterior de la cabeza; recibe entradas sensoriales del tacto

(p. 109)	y la posición del cuerpo. (p. 109)
partial (intermittent) reinforcement schedule reinforcing a response only part of the time; results in slower acquisition of a response but much greater resistance to extinction than does continuous reinforcement. (p. 287)	**calendario de reforzamiento parcial (intermitente)** reforzamiento de una respuesta tan solo una parte del tiempo; tiene como resultado la adquisición más lenta de una respuesta pero mucho más resistente a la extinción que el reforzamiento continuo. (p. 287)
passionate love an aroused state of intense positive absorption in another, usually present at the beginning of a romantic relationship. (p. 812)	**amor apasionado** estado excitado de intensa y positiva absorción en otro ser. Por lo general se observa al comienzo de una relación de amor romántica. (p. 812)
perception the process of organizing and interpreting sensory information, enabling us to recognize meaningful objects and events. (p. 158)	**percepción** proceso mediante el cual el cerebro organiza e interpreta la información sensorial transformándola en objetos y sucesos que tienen sentido. (p. 158)
perceptual adaptation the ability to adjust to changed sensory input, including an artificially displaced or even inverted visual field. (p. 195)	**adaptación perceptiva** capacidad de ajustarnos a un estímulo sensorial cambiado, como por ejemplo un campo visual artificialmente desplazado o incluso invertido. (p. 195)
perceptual constancy perceiving objects as unchanging (having consistent color, brightness, shape, and size) even as illumination and retinal images change. (p. 191)	**constancia perceptiva** tendencia a percibir objetos como si fueran constantes e inalterables (como si mantuvieran el color, el brillo, la forma y el tamaño), a pesar de los cambios que se produzcan en la iluminación y en las imágenes que llegan a la retina. (p. 191)
perceptual set a mental predisposition to perceive one thing and not another. (p. 169)	**predisposición perceptiva** predisposición mental para percibir una cosa y no otra. (p. 169)
peripheral nervous system (PNS) the sensory and motor neurons that connect the central nervous system (CNS) to the rest of the body. (p. 92)	**sistema nervioso periférico (SNP)** neuronas sensoriales y motrices que conectan el sistema nervioso central con el resto del organismo. (p. 92)
peripheral route persuasion	**ruta de persuasión periférica**

occurs when people are influenced by incidental cues, such as a speaker's attractiveness. (p. 771)	se produce cuando las personas se ven influenciadas por señales triviales, como el atractivo del orador. (p. 771)
personal control our sense of controlling our environment rather than feeling helpless. (p. 306)	**control personal** nuestro sentido de controlar el entorno en lugar de sentirnos impotentes. (p. 306)
personality an individual's characteristic pattern of thinking, feeling, and acting. (p. 578)	**personalidad** forma característica de pensar, sentir y actuar de una persona. (p. 578)
personality disorders inflexible and enduring behavior patterns that impair social functioning. (p. 710)	**trastornos de la personalidad** patrón de comportamientos inflexibles y duraderos que se interponen ante el desempeño social. (p. 710)
personality inventory a questionnaire (often with *true-false* or *agree-disagree* items) on which people respond to items designed to gauge a wide range of feelings and behaviors; used to assess selected personality traits. (p. 598)	**inventario de personalidad** cuestionario (a menudo de preguntas de *falso o verdadero* o de *desacuerdo/acuerdo*) en el que las personas responden a consultas diseñadas para medir una amplia gama de sentimientos y conductas; se usa para evaluar ciertos rasgos de la personalidad. (p. 598)
personality psychology the study of individuals' characteristic patterns of thinking, feeling, and acting. (p. 24)	**psicología de la personalidad** el estudio de los patrones característicos de pensar, sentir y actuar de las persona. (p. 24)
PET (positron emission tomography) scan a visual display of brain activity that detects where a radioactive form of glucose goes while the brain performs a given task. (p. 99)	**TEP (tomografía por emisión de positrones)** muestra visual de la actividad cerebral que detecta hacia dónde se dirige un tipo de glucosa radiactiva en el momento en que el cerebro realiza una función particular. (p. 99)
phi phenomenon an illusion of movement created when two or more adjacent lights blink on and off in quick succession. (p. 190)	**fenómeno phi** ilusión de movimiento creada por dos o más luces adyacentes que parpadean en sucesión rápida. (p. 190)
phobia an anxiety disorder marked by a persistent, irrational fear and avoidance of a specific	**fobia** trastorno de ansiedad marcado por un temor persistente e irracional, y la evasión de un

object, activity, or situation. (p. 679)	objeto, actividad o situación específicos. (p. 679)
phoneme in a language, the smallest distinctive sound unit. (p. 381)	**fonema** en un lenguaje, la unidad distintiva de sonido más pequeña. (p. 381)
physiological need a basic bodily requirement. (p. 403)	**necesidad fisiológica** exigencia básica del cuerpo. (p. 403)
pitch a tone’s experienced highness or lowness; depends on frequency. (p. 198)	**tono** propiedad de los sonidos que los caracteriza como agudos o graves; depende de la frecuencia. (p. 198)
pituitary gland the endocrine system’s most influential gland. Under the influence of the hypothalamus, the pituitary regulates growth and controls other endocrine glands. (p. 96)	**glándula pituitaria** la glándula más influyente del sistema endocrino. Bajo la influencia del hipotálamo, la glándula pituitaria regula el crecimiento y controla las demás glándulas endocrinas. (p. 96)
place theory in hearing, the theory that links the pitch we hear with the place where the cochlea’s membrane is stimulated. (p. 202)	**teoría del lugar** en la audición, la teoría que relaciona el tono que escuchamos con el sitio donde se estimula la membrana de la cóclea. (p. 202)
placebo [pluh-SEE-bo; Latin for “I shall please”] **effect** experimental results caused by expectations alone; any effect on behavior caused by the administration of an inert substance or condition, which the recipient assumes is an active agent. (p. 55)	**efecto placebo** resultados producidos únicamente por las expectativas; cualquier efecto sobre el comportamiento causado por el suministro de una sustancia o condición inerte, que el receptor supone que es un agente activo. (p. 55)
plasticity the brain’s ability to change, especially during childhood, by reorganizing after damage or by building new pathways based on experience. (p. 116)	**plasticidad** capacidad del cerebro de modificarse, sobre todo durante la niñez, reordenándose después de un daño cerebral o formando nuevas trayectorias basadas en la experiencia. (p. 116)
polygraph a machine used in attempts to detect lies that measures several of the physiological responses (such as perspiration, heart rate, and breathing changes) accompanying	**polígrafo** máquina, utilizada comúnmente con la intención de detectar mentiras, que mide ciertas reacciones corporales (como los cambios en la transpiración, el ritmo

emotion. (p. 439)	cardíaco y la respiración) que acompañan a las emociones. (p. 439)
population all those in a group being studied, from which samples may be drawn. (*Note:* Except for national studies, this does not refer to a country’s whole population.) (p. 47)	**población** todos aquellos que constituyen el grupo que se está estudiando, a partir del cual se pueden tomar muestras. (*Nota*: salvo en estudios de alcance nacional, no se refiere a la totalidad de la población de un país). (p. 47)
positive psychology the scientific study of human flourishing, with the goals of discovering and promoting strengths and virtues that help individuals and communities to thrive. (pp. 16, 473)	**psicología positiva** estudio científico del funcionamiento humano, que tiene las metas de descubrir y promover las fortalezas y las virtudes que ayudan a los individuos y a las comunidades a prosperar. (pp. 16, 473)
positive reinforcement increasing behaviors by presenting positive reinforcers. A positive reinforcer is any stimulus that, when *presented* after a response, strengthens the response. (p. 285)	**reforzamiento positivo** aumento en la expresión de comportamientos mediante la presentación de estímulos positivos, por ejemplo, un alimento. Un reforzamiento positivo es cualquier cosa que, presentada después de una respuesta, refuerza esa respuesta. (p. 285)
posthypnotic suggestion a suggestion, made during a hypnosis session, to be carried out after the subject is no longer hypnotized; used by some clinicians to help control undesired symptoms and behaviors. (p. 226)	**sugerencia poshipnótica** sugerencia que se hace durante una sesión de hipnotismo, que el sujeto debe realizar cuando ya no está hipnotizado; la usan algunos practicantes para ayudar a controlar síntomas y conductas no deseadas. (p. 226)
posttraumatic growth positive psychological changes as a result of struggling with extremely challenging circumstances and life crises. (p. 760)	**crecimiento postraumático** cambios psicológicos positivos como resultado de la lucha contra circunstancias extremadamente difíciles y crisis de la vida. (p. 760)
posttraumatic stress disorder (PTSD) a disorder characterized by haunting memories, nightmares, hypervigilance, social withdrawal, jumpy anxiety, numbness of feeling, and/or insomnia that lingers for four weeks or more after a traumatic experience. (p. 680)	**trastorno por estrés postraumático (TEPT)** trastorno de ansiedad caracterizado por recuerdos inquietantes, pesadillas, aislamiento social, ansiedad asustadiza, y/o insomnio que perdura por cuatro semanas o más después de una experiencia traumática. (p. 680)

predictive validity the success with which a test predicts the behavior it is designed to predict; it is assessed by computing the correlation between test scores and the criterion behavior. (Also called *criterion-related validity*.) (p. 637)	**validez predictiva** nivel de éxito con el que una prueba predice el comportamiento para el que ha sido diseñada para predecir. Se evalúa mediante la medición de la correlación de los resultados de las pruebas y el comportamiento de criterio. (También se conoce como *validez relacionada con el criterio*). (p. 637)
prejudice an unjustifiable (and usually negative) attitude toward a group and its members. Prejudice generally involves stereotyped beliefs, negative feelings, and a predisposition to discriminatory action. (p. 792)	**prejuicio** actitud injustificable y normalmente negativa hacia un grupo y sus integrantes. Los prejuicios generalmente implican creencias estereotipadas, sentimientos negativos y una predisposición a la acción discriminatoria. (p. 792)
preoperational stage in Piaget's theory, the stage (from about 2 to 6 or 7 years of age) during which a child learns to use language but does not yet comprehend the mental operations of concrete logic. (p. 500)	**etapa preoperacional** en la teoría de Piaget, la etapa (desde alrededor de los 2 hasta los 6 o 7 años de edad) durante la que el niño aprende a utilizar el lenguaje; pero todavía no comprende las operaciones mentales de la lógica concreta. (p. 500)
preparedness a biological predisposition to learn associations, such as between taste and nausea, that have survival value. (p. 300)	**estado de preparación** predisposición biológica a aprender asociaciones, por ejemplo entre cierto sabor y la sensación de náusea, que tienen valor para la supervivencia. (p. 300)
primary reinforcer an innately reinforcing stimulus, such as one that satisfies a biological need. (p. 286)	**reforzador primario** suceso que es inherentemente reforzador y a menudo satisface una necesidad biológica. (p. 286)
primary sex characteristics the body structures (ovaries, testes, and external genitalia) that make sexual reproduction possible. (p. 546)	**características primarias del sexo** estructuras del organismo (ovarios, testículos y aparatos genitales externos) que posibilitan la reproducción sexual. (p. 546)
priming the activation, often unconsciously, of certain associations, thus predisposing one's perception, memory, or response. (pp. 165, 345)	**preparación** activación de asociaciones en nuestra memoria, a menudo de manera inconsciente, que nos dispone a percibir o recordar objetos o sucesos de una manera determinada. (pp. 165, 345)

proactive interference the forward-acting disruptive effect of older learning on the recall of *new* information. (p. 354)	**interferencia proactiva** efecto interruptor del aprendizaje anterior sobre la manera de recordar información *nueva*. (p. 354)
problem-focused coping attempting to alleviate stress directly—by changing the stressor or the way we interact with that stressor. (p. 306)	**superación con enfoque en los problemas** intento de sobrellevar el estrés de manera directa cambiando ya sea lo que produce la tensión o la forma en que nos relacionamos con dicho factor de estrés. (p. 306)
projective test a personality test, such as the Rorschach, that provides ambiguous images designed to trigger projection of one's inner dynamics. (p. 584)	**prueba de proyección** tipo de prueba de la personalidad, como la prueba de Rorschach, que muestra imágenes ambiguas a los sujetos para provocar una proyección de sus dinámicas internas. (p. 584)
prosocial behavior positive, constructive, helpful behavior. The opposite of antisocial behavior. (p. 315)	**comportamiento prosocial** comportamiento positivo, constructivo, útil. Lo contrario del comportamiento antisocial. (p. 315)
prototype a mental image or best example of a category. Matching new items to a prototype provides a quick and easy method for sorting items into categories (as when comparing feathered creatures to a prototypical bird, such as a robin). (p. 365)	**prototipo** imagen mental o mejor ejemplo de una categoría. Al cotejar artículos nuevos con un prototipo se trabaja con un método rápido y sencillo para clasificar artículos en categorías (tal como cuando se comparan animales de plumas con un ave prototípico, como un petirrojo). (p. 365)
psychiatry a branch of medicine dealing with psychological disorders; practiced by physicians who are licensed to provide medical (for example, drug) treatments as well as psychological therapy. (p. 25)	**psiquiatría** rama de la medicina que se ocupa de los trastornos psicológicos; es ejercida por médicos que tienen licencia para ofrecer tratamientos (con medicamentos, por ejemplo), además de terapia psicológica. (p. 25)
psychoactive drug a chemical substance that alters perceptions and moods. (p. 253)	**fármaco psicoactivo** sustancia química que altera las percepciones y el estado de ánimo. (p. 253)
psychoanalysis (1) Freud's theory of personality that	**psicoanálisis** (1) teoría de Freud sobre la personalidad que

attributes thoughts and actions to unconscious motives and conflicts. (2) Sigmund Freud's therapeutic technique used in treating psychological disorders. Freud believed the patient's free associations, resistances, dreams, and transferences—and the therapist's interpretations of them—released previously repressed feelings, allowing the patient to gain self-insight. (pp. 579, 723)	atribuye los pensamientos y las acciones a motivos y conflictos inconscientes. (2) El método terapéutico de Freud usado para el tratamiento de trastornos psicológicos. Freud creía que las asociaciones libres, las resistencias, los sueños y las transferencias del paciente (así como la interpretación de ellas por parte del analista) liberaban sentimientos antes reprimidos, permitiendo que el paciente adquiriera agudeza introspectiva. (pp. 579, 723)
psychodynamic psychology a branch of psychology that studies how unconscious drives and conflicts influence behavior and uses that information to treat people with psychological disorders. (p. 18)	**psicología psicodinámica** rama de la psicología que estudia como los conflictos e impulsos inconscientes influyen en el comportamiento y que usa esa información para tratar a personas con trastornos psicológicos. (p. 18)
psychodynamic theories theories that view personality with a focus on the unconscious and the importance of childhood experiences. (p. 578)	**teorías psicodinámicas** visión de la personalidad con una concentración en el subconsciente y en la importancia de las vivencias en la niñez. (p. 578)
psychodynamic therapy therapy deriving from the psychoanalytic tradition; views individuals as responding to unconscious forces and childhood experiences, and seeks to enhance self-insight. (p. 724)	**terapia psicodinámica** enfoque terapéutico que se deriva de la tradición psicoanalítica; se observa a los individuos como si respondieran a fuerzas inconscientes y experiencias de la niñez, y se busca agudizar la introspección. (p. 724)
psychological disorder a syndrome marked by a clinically significant disturbance in an individual's cognition, emotion regulation, or behavior. (p. 666)	**trastorno psicológico** síndrome caracterizado por la alteración clínicamente significativa de los pensamientos, los sentimientos y los comportamientos de una persona. (p. 666)
psychology the science of behavior and mental processes. (p. 13)	**psicología** estudio científico de los procesos psicológicos y mentales. (p. 13)
psychometrics the scientific study of the measurement of human abilities, attitudes, and traits. (p. 24)	**psicometría** estudio científico de medición de las habilidades, actitudes y rasgos humanos. (p. 24)
psychoneuroimmunology	**psiconeuroimunología**

the study of how psychological, neural, and endocrine processes together affect the immune system and resulting health. (p. 456)	estudio de cómo los procesos psicológicos, neuronales y endocrinos se combinan en nuestro organismo para influenciar el sistema inmunológico y la salud en general. (p. 456)
psychopharmacology the study of the effects of drugs on mind and behavior. (p. 753)	**psicofarmacología** estudio de los efectos de los medicamentos sobre la mente y el comportamiento. (p. 753)
psychophysics the study of relationships between the physical characteristics of stimuli, such as their intensity, and our psychological experience of them. (p. 162)	**psicofísica** el estudio de las relaciones entre las características físicas de los estímulos, por ejemplo su intensidad, y nuestra experiencia psicológica de esos estímulos. (p. 162)
psychosexual stages the childhood stages of development (oral, anal, phallic, latency, genital) during which, according to Freud, the id's pleasure-seeking energies focus on distinct erogenous zones. (p. 580)	**etapas psicosexuales** etapas del desarrollo infantil (oral, anal, fálica, latente, genital), durante las cuales, según Freud, las energías del id que buscan el placer se enfocan en zonas erógenas específicas. (p. 580)
psychosurgery surgery that removes or destroys brain tissue in an effort to change behavior. (p. 758)	**psicocirugía** cirugía que extrae o destruye tejido cerebral para cambiar el comportamiento. (p. 758)
psychotherapy treatment involving psychological techniques; consists of interactions between a trained therapist and someone seeking to overcome psychological difficulties or achieve personal growth. (p. 722)	**psicoterapia** tratamiento que incluye técnicas psicológicas; consiste en interacciones entre un terapeuta cualificado y una persona que desea superar dificultades psicológicas o lograr un crecimiento personal. (p. 722)
psychotic disorders a group of disorders marked by irrational ideas, distorted perceptions, and a loss of contact with reality. (p. 699)	**trastornos psicóticos** conjunto de trastornos caracterizados por ideas irracionales, percepciones distorsionadas y pérdida de contacto con la realidad. (p. 699)
puberty the period of sexual maturation, during which a person becomes capable of reproducing. (p. 533)	**pubertad** período de maduración sexual durante el cual la persona adquiere la capacidad de reproducirse. (p. 533)
punishment an event that tends to *decrease* the behavior that it follows. (p. 289)	**castigo** evento que *disminuye* el comportamiento que le precede. (p. 289)

pupil the adjustable opening in the center of the eye through which light enters. (p. 177)	**pupila** la apertura ajustable del centro del ojo que permite el acceso de la luz. (p. 177)
R	
random assignment assigning participants to experimental and control groups by chance, thus minimizing preexisting differences between the different groups. (p. 54)	**asignación aleatoria** asignación de participantes al grupo experimental o al de control. Se realiza al azar para minimizar las diferencias preexistentes que pudiese haber entre los grupos asignados. (p. 54)
random sample a sample that fairly represents a population because each member has an equal chance of inclusion. (p. 47)	**muestra aleatoria** muestra que representa justamente la población, gracias a que cada elemento de la población tiene igual oportunidad de ser seleccionado. (p. 47)
range the difference between the highest and lowest scores in a distribution. (p. 68)	**rango** diferencia entre las puntuaciones más alta y más baja en una distribución. (p. 68)
rational-emotive behavior therapy (REBT) a confrontational cognitive therapy, developed by Albert Ellis, that vigorously challenges people’s illogical, self-defeating attitudes and assumptions. (p. 733)	**terapia racional emotiva conductual (TREC)** terapia cognitiva de confrontación desarrollada por Albert Ellis, que cuestiona vigorosamente las actitudes y suposiciones ilógicas y derrotistas de las personas. (p. 733)
recall a measure of memory in which the person must retrieve information learned earlier, as on a fill-in-the-blank test. (p. 327)	**recordación** memoria que se demuestra recuperando información aprendida anteriormente, tal como en las pruebas que consisten en rellenar espacios en blanco. (p. 327)
reciprocal determinism the interacting influences of behavior, internal cognition, and environment. (p. 606)	**determinismo reciproco** la interacción de las influencias del comportamiento, cognición intrna y el entorno. (p. 606)
reciprocity norm an expectation that people will help, not hurt, those who have helped them. (p. 818)	**norma de reciprocidad** expectativa de que las personas ayudarán, y no harán daño, a aquellos que las han ayudado. (p. 818)

recognition a measure of memory in which the person identifies items previously learned, as on a multiple-choice test. (p. 327)	**reconocimiento** memoria que se demuestra identificando cosas que se aprendieron anteriormente, tal como en las pruebas de opción múltiple. (p. 327)
reconsolidation a process in which previously stored memories, when retrieved, are potentially altered before being stored again. (p. 356)	**reconsolidación** proceso en el que los recuerdos almacenados, al ser recuperados, son potencialmente alterados antes de ser almacenados nuevamente. (p. 356)
reflex a simple, automatic response to a sensory stimulus, such as the knee-jerk response. (p. 94)	**reflejo** respuesta simple y automática a un estímulo sensorial, por ejemplo el reflejo rotular (mover la pierna para evitar un peligro repentino). (p. 94)
refractory period (1) in neural processing, a brief resting pause that occurs after a neuron has fired; subsequent action potentials cannot occur until the axon returns to its resting state. (2) in human sexuality, a resting period that occurs after orgasm, during which a person cannot achieve another orgasm. (pp. 83, 420)	**período refractario** (1) en el procesamiento neuronal, una breve fase de descanso que se produce después de que una neurona ha disparado. No se pueden producir potenciales subsiguientes de acción hasta que el axón vuelva a su estado de reposo. (2) en la sexualidad humana, fase de descanso que se produce después del orgasmo, en la que el varón es incapaz de tener otro orgasmo. (pp. 83, 420)
regression toward the mean the tendency for extreme or unusual scores or events to fall back (regress) toward the average. (p. 53)	**regresión hacia la media** tendencia hacia las puntuaciones o eventos extremos o poco comunes para así retornar (regresar) hacia el promedio. (p. 53)
reinforcement in operant conditioning, any event that *strengthens* the behavior it follows. (p. 284)	**reforzamiento** según el condicionamiento operante, todo suceso que *fortalezca* el comportamiento al que sigue. (p. 284)
reinforcement schedule a pattern that defines how often a desired response will be reinforced. (p. 287)	**plan de reforzamiento** patrón que define la frecuencia con que se reforzará una respuesta deseada. (p. 287)
relational aggression an act of aggression (physical or verbal) intended to harm a person’s relationship or social standing. (p. 521)	**regresión relacional** acto de agresión (sea física o verbal) que tiene por intención hacerle daño a las relaciones de la persona o a su estatus social. (p. 521)

relative deprivation the perception that one is worse off relative to those with whom one compares oneself. (p. 476)	**privación relativa** impresión de que estamos en peor situación que aquellos con quienes nos comparamos. (p. 476)
relearning a measure of memory that assesses the amount of time saved when learning material again. (p. 327)	**reaprendizaje** medida de memoria que evalúa el tiempo que se ahorra cuando se aprende algo por segunda vez. (p. 327)
reliability the extent to which a test yields consistent results, as assessed by the consistency of scores on two halves of the test, on alternative forms of the test, or on retesting. (p. 636)	**fiabilidad** grado de coherencia de los resultados de una prueba, que se comprueba por la uniformidad de las puntuaciones en las dos mitades de la prueba, en formas distintas de la prueba, o al repetir la prueba. (p. 636)
REM rebound the tendency for REM sleep to increase following REM sleep deprivation. (p. 251)	**rebote de MOR** tendencia al aumento del sueño MOR como consecuencia de la privación del sueño MOR. (p. 251)
REM sleep rapid eye movement sleep; a recurring sleep stage during which vivid dreams commonly occur. Also known as *paradoxical sleep*, because the muscles are relaxed (except for minor twitches) but other body systems are active. (p. 232)	**sueño MOR** sueño de movimiento ocular rápido; etapa recurrente del sueño durante la cual generalmente ocurren sueños gráficos. También se conoce como *sueño paradójico*, porque los músculos están relajados (salvo unos espasmos mínimos) pero los demás sistemas del cuerpo están activos. (p. 232)
repetitive transcranial magnetic stimulation (rTMS) the application of repeated pulses of magnetic energy to the brain; used to stimulate or suppress brain activity. (p. 757)	**estimulación magnética transcraneal repetitiva (EMTR)** aplicación repetitiva de pulsos de energía magnética al cerebro. Se utiliza para estimular o suprimir la actividad cerebral. (p. 757)
replication repeating the essence of a research study, usually with different participants in different situations, to see whether the basic finding can be reproduced. (p. 43)	**replicación** repetir la esencia de un estudio de investigación, por lo general con participantes diferentes y en situaciones diferentes, para ver si las conclusiones básicas se pueden reproducir. (p. 43)
representativeness heuristic estimating the likelihood of events in terms of how well they seem to represent, or	**heurística de la representatividad** estima la probabilidad de cierto evento en función de qué tan bien representan o

match, particular prototypes; may lead us to ignore other relevant information. (p. 372)	corresponden a prototipos particulares; posiblemente nos lleve a ignorar otra información relevante. (p. 372)
repression in psychoanalytic theory, the basic defense mechanism that banishes from consciousness anxiety-arousing thoughts, feelings, and memories. (pp. 355, 581)	**represión** en la teoría del psicoanálisis, el mecanismo básico de defensa por medio del cual el sujeto elimina de su consciente aquellos pensamientos, emociones o recuerdos que le producen ansiedad. (pp. 355, 581)
resilience the personal strength that helps most people cope with stress and recover from adversity and even trauma. (p. 760)	**resiliencia** fuerza personal que ayuda a la mayoría de las personas a asumir con flexibilidad situaciones de estrés y recuperarse de la adversidad e incluso de un trauma. (p. 760)
resistance in psychoanalysis, the blocking from consciousness of anxietyladen material. (p. 723)	**resistencia** en el psicoanálisis, bloquear del consciente aquello que está cargado de ansiedad. (p. 723)
respondent behavior behavior that occurs as an automatic response to some stimulus. (p. 271)	**comportamiento de respuesta** comportamiento que ocurre como respuesta automática a un estímulo. (p. 271)
reticular formation a nerve network that travels through the brainstem into the thalamus and plays an important role in controlling arousal. (p. 102)	**formación reticular** red de nervios que atraviesa el tronco encefálico e ingresa en el tálamo y que desempeña un papel importante en el control de la excitación. (p. 102)
retina the light-sensitive inner surface of the eye, containing the receptor rods and cones plus layers of neurons that begin the processing of visual information. (p. 177)	**retina** superficie en la parte interior del ojo que es sensible a la luz y que contiene los receptores de luz llamados bastoncillos y conos, además de capas de neuronas que inician el procesamiento de la información visual. (p. 177)
retinal disparity a binocular cue for perceiving depth. By comparing retinal images from the two eyes, the brain computes distance—the greater the disparity (difference) between the two images, the closer the object. (p. 189)	**disparidad retiniana** clave binocular para la percepción de la profundidad. Mediante la comparación de las imágenes que provienen de ambos ojos, el cerebro calcula la distancia. Cuanto mayor sea la disparidad (diferencia) entre dos imágenes, más cerca estará el objeto. (p. 189)

retrieval the process of getting information out of memory storage. (p. 329)	**recuperación** proceso de extraer la información que está almacenada en la memoria. (p. 329)
retroactive interference the backward-acting disruptive effect of newer learning on the recall of *old* information. (p. 354)	**interferencia retroactiva** efecto interruptor de algo nuevo que se ha aprendido en la capacidad de recordar información vieja. (p. 354)
retrograde amnesia an inability to retrieve information from one’s past. (p. 351)	**amnesia retrógrada** incapacidad de una persona para recuperar información de su pasado. (p. 351)
reuptake a neurotransmitter’s reabsorption by the sending neuron. (p. 86)	**recaptación** reabsorción de un neurotransmisor por la neurona emisora. (p. 86)
rods retinal receptors that detect black, white, and gray, and are sensitive to movement; necessary for peripheral and twilight vision, when cones don’t respond. (p. 178)	**bastoncillos** receptores de la retina que detectan el negro, el blanco y el gris, y que son sensibles al movimiento; necesarios para la visión periférica y en la penumbra cuando los conos no responden. (p. 178)
role a set of expectations (norms) about a social position, defining how those in the position ought to behave. (pp. 525, 772)	**rol** conjunto de expectativas (normas) acerca de una posición social, que definen la forma en que deben comportarse las personas que ocupan esa posición. (pp. 525, 772)
Rorschach inkblot test the most widely used projective test; a set of 10 inkblots, designed by Hermann Rorschach; seeks to identify people’s inner feelings by analyzing their interpretations of the blots. (p. 584)	**prueba de Rorschach** prueba proyectiva de amplio uso; conjunto de 10 manchas de tinta, diseñado por Hermann Rorschach; busca identificar los sentimientos internos de las personas mediante el análisis de sus interpretaciones de las manchas. (p. 584)
rumination compulsive fretting; *overthinking* our problems and their causes. (p. 693)	**ruminación** preocupación compulsiva; *pensar excesivamente* en nuestros problemas y sus causas. (p. 693)
S	
sampling bias a flawed sampling process that produces an	**sesgo de muestreo** proceso de muestreo fallido que produce una

unrepresentative sample. (p. 47)	muestra no representativa. (p. 47)
savant syndrome a condition in which a person otherwise limited in mental ability has an exceptional specific skill, such as in computation or drawing. (p. 627)	**síndrome de savant** condición según la cual una persona de capacidad mental limitada, cuenta con una destreza excepcional en un campo como la computación o el dibujo. (p. 627)
scaffold a framework that offers children temporary support as they develop higher levels of thinking. (p. 503)	**andamiaje** estructura que ofrece apoyo provisional a los niños mientras desarrollan un orden más alto de pensamiento. (p. 503)
scapegoat theory the theory that prejudice offers an outlet for anger by providing someone to blame. (p. 797)	**teoría del chivo expiatorio** teoría que expone que el prejuicio ofrece un escape para el enojo porque nos brinda a alguien a quien culpar. (p. 797)
scatterplot a graphed cluster of dots, each of which represents the values of two variables. The slope of the points suggests the direction of the relationship between the two variables. The amount of scatter suggests the strength of the correlation (little scatter indicates high correlation). (p. 51)	**gráfico de aspersión** conjunto de datos graficados, cada uno de los cuales representa los valores de dos variables. La pendiente de los puntos sugiere el sentido de la relación entre las dos variables. El nivel de aspersión sugiere la fuerza de la correlación (un bajo nivel de aspersión indica alta correlación). (p. 51)
schema a concept or framework that organizes and interprets information. (p. 498)	**esquema** concepto o marco referencial que organiza e interpreta la información. (p. 498)
schizophrenia a disorder characterized by delusions, hallucinations, disorganized speech, and/or diminished, inappropriate emotional expression. (p. 699)	**esquizofrenia** trastorno caracterizado por delirios, alucinaciones, habla desorganizada y/o expresión emocional disminuida o inapropiada. (p. 699)
secondary sex characteristics nonreproductive sexual traits, such as female breasts and hips, male voice quality, and body hair. (p. 546)	**características secundarias del sexo** rasgos sexuales no relacionados con la reproducción, tales como los senos y las caderas de las mujeres, la calidad de la voz del varón, y el vello corporal. (p. 546)
secure attachment demonstrated by infants who comfortably explore environments in the presence of their caregiver, show only temporary distress	**apego seguro** exhibido por infantes que exploran su entorno cómodamente en la presencia de su cuidador, sólo muestran angustia temporal

when the caregiver leaves, and find comfort in the caregiver's return. (p. 511)	en ausencia del cuidador, y se consuelan con el retorno del cuidador. (p. 511)
selective attention the focusing of conscious awareness on a particular stimulus. (p. 159)	**atención selectiva** capacidad de enfocar la consciencia en un estímulo en particular. (p. 159)
self in contemporary psychology, assumed to be the center of personality, the organizer of our thoughts, feelings, and actions. (p. 611)	**yo** imagen que tenemos de nosotros mismos y entendimiento de quiénes somos. Según la psicología moderna, el concepto de que éste es el centro de la personalidad, que organiza los pensamientos, los sentimientos y las acciones. (p. 611)
self-actualization according to Maslow, one of the ultimate psychological needs that arises after basic physical and psychological needs are met and self-esteem is achieved; the motivation to fulfill one's potential. (p. 591)	**autorrealización** según Maslow, necesidad psicológica que surge después de satisfacer las necesidades físicas y psicológicas y de lograr la autoestima; motivación para realizar nuestro potencial pleno. (p. 591)
self-concept all our thoughts and feelings about ourselves in answer to the question, "Who am I?" (pp. 515, 592)	**concepto de uno mismo** todo lo que pensamos y sentimos acerca de nosotros mismos cuando respondemos a la pregunta: "¿Quién soy?". (pp. 515, 592)
self-control the ability to control impulses and delay short-term gratification for greater long-term rewards. (p. 309)	**autocontrol** capacidad de controlar los impulsos y demorar la gratificación a corto plazo con el fin de obtener mayores recompensas a largo plazo. (p. 309)
self-disclosure the act of revealing intimate aspects of ourselves to others. (p. 814)	**revelación personal** revelación a los demás de cosas íntimas de nuestro ser. (p. 814)
self-efficacy one's sense of competence and effectiveness. (p. 612)	**autoeficacia** nuestros sentimientos de competencia y eficacia. (p. 612)
self-esteem one's feelings of high or low self-worth. (p. 612)	**autoestima** los sentimientos propios de alto o bajo valor. (p. 612)
self-fulfilling prophecy	**profecía autorrealizada**

a belief that leads to its own fulfillment. (p. 820)	creencia que conduce a su propia realización. (p. 820)
self-serving bias a readiness to perceive oneself favorably. (p. 614)	**sesgo autocomplaciente** disposición para percibirnos a nosotros mismos de manera favorable. (p. 614)
self-transcendence according to Maslow, the striving for identity, meaning, and purpose beyond the self. (p. 591)	**autotrascendencia** según Maslow, esfuerzo por alcanzar una identidad, un sentido y un propósito que vaya más allá de uno mismo. (p. 591)
semantic memory explicit memory of facts and general knowledge; one of our two conscious memory systems (the other is *episodic memory*). (p. 340)	**memoria semántica** memoria explícita de hechos y conocimientos generales. Uno de los dos sistemas de memoria conscientes (el otro es la memoria episódica). (p. 340)
sensation the process by which our sensory receptors and nervous system receive and represent stimulus energies from our environment. (p. 158)	**sensación** proceso mediante el cual los receptores sensoriales y el sistema nervioso reciben las energías de los estímulos provenientes de nuestro entorno. (p. 158)
sensorimotor stage in Piaget’s theory, the stage (from birth to nearly 2 years of age) during which infants know the world mostly in terms of their sensory impressions and motor activities. (p. 499)	**etapa sensoriomotriz** en la teoría de Piaget, la etapa (de los 0 a los 2 años de edad) durante la cual los bebés conocen el mundo principalmente en términos de sus impresiones sensoriales y actividades motoras. (p. 499)
sensorineural hearing loss hearing loss caused by damage to the cochlea’s receptor cells or to the auditory nerves; the most common form of hearing loss, also called *nerve deafness*. (p. 200)	**pérdida de la audición sensorineuronal** sordera causada por daños a la células receptoras de la cóclea o a los nervios de la audición; la forma más común de sordera. También se le dice *sordera nerviosa*. (p. 200)
sensory (afferent) neurons neurons that carry incoming information from the body’s tissues and sensory receptors to the brain and spinal cord. (p. 93)	**neurona sensorial (aferente)** neurona que conduce la información que le llega desde los tejidos del cuerpo y los receptores sensoriales al cerebro y la médula espinal. (p. 93)
sensory adaptation diminished sensitivity as a consequence of constant stimulation. (p. 165)	**adaptación sensorial** disminución en la sensibilidad como respuesta a la estimulación constante. (p.

	165)
sensory interaction the principle that one sense may influence another, as when the smell of food influences its taste. (p. 214)	**interacción sensorial** principio según el cual un sentido puede influir en otro, como cuando el olor de la comida influye en su sabor. (p. 214)
sensory memory the immediate, very brief recording of sensory information in the memory system. (p. 329)	**memoria sensorial** registro breve e inmediato de la información sensorial en el sistema de la memoria. (p. 329)
sensory receptors sensory nerve endings that respond to stimuli. (p. 158)	**receptores sensoriales** terminales nerviosas sensoriales que responden a estímulos. (p. 158)
sequential processing processing one aspect of a problem at a time; generally used to process new information or to solve difficult problems. (p. 126)	**procesamiento secuencial** procesamiento de un aspecto de un problema a la vez; se utiliza cuando centramos la atención en tareas nuevas o complejas. (p. 126)
serial position effect our tendency to recall best the last *(recency effect)* and first *(primacy effect)* items in a list. (p. 347)	**efecto de posición serial** tendencia a recordar con mayor facilidad los elementos del comienzo (*efecto de primacía*) y el final (*efecto de recencia*) de una lista. (p. 347)
set point the point at which your “weight thermostat” may be set. When your body falls below this weight, increased hunger and a lowered metabolic rate may combine to restore lost weight. (p. 411)	**punto fijo** punto de supuesto equilibrio en el “termostato del peso” de una persona. Cuando el cuerpo alcanza un peso por debajo de este punto, se produce un aumento en el hambre y una disminución en el índice metabólico, los cuales pueden actuar para restablecer el peso perdido. (p. 411)
sex in psychology, the biologically influenced characteristics by which people define *male* and *female*. (p. 520)	**sexo** en psicología, las características biológicas por las cuales la sociedad define al hombre y la mujer. (p. 520)
sexual orientation our enduring sexual attraction, usually toward members of our own sex (homosexual orientation) or the other sex (heterosexual orientation); variations include	**orientación sexual** nuestra atracción sexual principal hacia miembros de nuestro mismo sexo (orientación homosexual), del sexo opuesto (orientación heterosexual) o de ambos sexos

attraction toward both sexes (bisexual orientation). (p. 549)	(orientación bisexual). (p. 549)
sexual response cycle the four stages of sexual responding described by Masters and Johnson—excitement, plateau, orgasm, and resolution. (p. 419)	**ciclo de respuesta sexual** las cuatro etapas de respuesta sexual descritas por Masters y Johnson: excitación, meseta, orgasmo y resolución. (p. 419)
shallow processing encoding on a basic level, based on the structure or appearance of words. (p. 335)	**procesamiento superficial** codificación en un nivel básico, según la estructura o la apariencia de las palabras. (p. 335)
shaping an operant conditioning procedure in which reinforcers guide behavior toward closer and closer approximations of the desired behavior. (p. 284)	**modelamiento** procedimiento del condicionamiento operante en el cual los reforzadores conducen una acción con aproximaciones sucesivas hasta lograr el comportamiento deseado. (p. 284)
short-term memory activated memory that holds a few items briefly, such as digits of a phone number while calling, before the information is stored or forgotten. (p. 329)	**memoria a corto plazo** memoria activada que retiene algunos elementos por un corto tiempo, tales como los siete dígitos de un número telefónico mientras se marca, antes de que la información se almacene o se olvide. (p. 329)
signal detection theory a theory predicting how and when we detect the presence of a faint stimulus *(signal)* amid background stimulation *(noise)*. Assumes there is no single absolute threshold and that detection depends partly on a person's experience, expectations, motivation, and alertness. (p. 163)	**teoría de la detección de señales** teoría que predice cómo y cuando detectamos la presencia de un estímulo débil (*señal*) cuando hay estímulos de fondo (*ruido*). Supone que no hay un umbral absoluto y que la detección depende en parte en las experiencias, expectativas, motivaciones y estado de alerta de la persona. (p. 163)
skewed distribution a representation of scores that lack symmetry around their average value. (p. 67)	**sesgo de distribución** representación de puntajes que carece de simetría alrededor de su valor promedio. (p. 67)
sleep a periodic, natural loss of consciousness —as distinct from unconsciousness resulting	**sueño** pérdida del conocimiento periódica y natural; a diferencia de la inconsciencia que

from a coma, general anesthesia, or hibernation. (Adapted from Dement, 1999.) (p. 231)	puede resultar del estado de coma, de la anestesia general o de la hibernación. (Adaptado de Dement, 1999.) (p. 231)
sleep apnea a sleep disorder characterized by temporary cessations of breathing during sleep and repeated momentary awakenings. (p. 245)	**apnea del sueño** trastorno del sueño en el que se interrumpe repetidamente la respiración hasta que el nivel de oxígeno en la sangre disminuye tanto que la persona tiene que despertarse para respirar. (p. 245)
social anxiety disorder intense fear and avoidance of social situations. (Formerly called *social phobia*.) (p. 677)	**trastorno de ansiedad social** miedo intenso y evasión de situaciones sociales. (Conocido anteriormente como *fobia social*). (p. 677)
social clock the culturally preferred timing of social events such as marriage, parenthood, and retirement. (p. 565)	**reloj social** manera que la sociedad prefiere para marcar el tiempo adecuado de los eventos sociales, tales como el matrimonio, la paternidad y la jubilación. (p. 565)
social exchange theory the theory that our social behavior is an exchange process, the aim of which is to maximize benefits and minimize costs. (p. 818)	**teoría de intercambio social** teoría según la cual nuestro comportamiento se encuentra en un estado de intercambio, cuyo fin es maximizar los beneficios y minimizar los costos. (p. 818)
social facilitation improved performance on simple or well-learned tasks in the presence of others. (p. 784)	**facilitación social** mejoramiento del desempeño en funciones sencillas o bien aprendidas en la presencia de otros. (p. 784)
social identity the "we" aspect of our self-concept; the part of our answer to "Who am I?" that comes from our group memberships. (p. 539)	**identidad social** aspecto de "nosotros" dentro de nuestro concepto de nosotros mismos; parte de nuestra respuesta a "¿Quién soy?" que proviene de nuestra pertenencia a grupos. (p. 539)
social learning theory the theory that we learn social behavior by observing and imitating and by being rewarded or punished. (p. 525)	**teoría de aprendizaje social** teoría que señala que aprendemos la conducta social observando e imitando, y al ser recompensados o castigados. (p. 525)
social loafing the tendency for people in a group to exert less effort when pooling their efforts toward	**holgazanería social** tendencia de las personas en un grupo de realizar menos esfuerzo cuando juntan sus

attaining a common goal than when individually accountable. (p. 785)	esfuerzos para lograr una meta común que cuando son responsables individualmente. (p. 785)
social psychology the scientific study of how we think about, influence, and relate to one another. (pp. 24, 768)	**psicología social** estudio científico de cómo nos relacionamos con los demás y cómo influimos y pensamos en ellos. (pp. 24, 768)
social script a culturally modeled guide for how to act in various situations. (pp. 146, 804)	**guión social** guía modelada culturalmente acerca de cómo actuar en diversas situaciones. (pp. 146, 804)
social trap a situation in which the conflicting parties, by each pursuing their self-interest rather than the good of the group, become caught in mutually destructive behavior. (p. 819)	**trampa social** situación en la cual las partes en conflicto, al perseguir cada uno su interés propio y no el del grupo, caen en comportamientos mutuamente destructivos. (p. 819)
social-cognitive perspective views behavior as influenced by the interaction between people’s traits (including their thinking) and their social context. (p. 606)	**perspectiva sociocognitiva** contempla al comportamiento como susceptible a la influencia de la interacción entre los rasgos de las personas (que incluye su pensamiento) y su contexto social. (p. 606)
social-cultural psychology the study of how situations and cultures affect our behavior and thinking. (p. 18)	**psicología socio-cultural** estudio de cómo las situaciones y las culturas afectan nuestro comportamiento y pensamiento. (p. 18)
social-responsibility norm an expectation that people will help those needing their help. (p. 819)	**norma de responsabilidad social** expectativa según la cual las personas ayudarán a aquellos que necesitan ayuda. (p. 819)
somatic nervous system the division of the peripheral nervous system that controls the body’s skeletal muscles. Also called the *skeletal nervous system.* (p. 93)	**sistema nervioso somático** división del sistema nervioso periférico que controla los músculos esqueléticos del cuerpo. También llamado *sistema nervioso esquelético*. (p. 93)
somatic symptom disorder a psychological disorder in which the symptoms take a somatic (bodily) form without apparent physical cause. (Formerly called *somatoform disorder;* see *conversion disorder* and *illness anxiety disorder*.) (p.	**trastorno de síntomas somáticos** trastorno psicológico donde los síntomas toman una forma somática (corporal) sin causa física aparente. (Conocido anteriormente como *trastorno somatomorfo*; ver *trastorno de conversión* y *trastorno de*

707)	*ansiedad de enfermedad*). (p. 707)
somatosensory cortex an area at the front of the parietal lobes that registers and processes body touch and movement sensations. (p. 113)	**corteza somatosensorial** región de la corteza cerebral en la parte delantera de los lóbulos parietales. Registra y procesa el tacto y las sensaciones de movimiento. (p. 113)
source amnesia faulty memory for how, when, or where information was learned or imagined. (Also called *source misattribution.*) Source amnesia, along with the misinformation effect, is at the heart of many false memories. (p. 358)	**amnesia de la fuente** recuerdo errado de cómo, cuándo o dónde se aprendió o se imaginó la información. (Conocida también como *atribución errónea*). La amnesia de la fuente, junto con el efecto de información errónea, son la razón de muchos recuerdos falsos. (p. 358)
spacing effect the tendency for *distributed* study or practice to yield better long-term retention than is achieved through *massed* study or practice. (p. 334)	**efecto de memoria espaciada** tendencia en la que el estudio o la práctica *distribuida* rinde mejor retención a largo plazo que el estudio o práctica *en masa*. (p. 334)
spermarche [sper-MAR-key] the first ejaculation. (p. 547)	**espermarca** primera eyaculación. (p. 547)
split brain a condition resulting from surgery that isolates the brain's two hemispheres by cutting the fibers (mainly those of the corpus callosum) connecting them. (p. 120)	**cerebro dividido** condición en la que los dos hemisferios cerebrales se privan de la comunicación mediante el corte quirúrgico de las fibras que los conectan (principalmente las del cuerpo calloso). (p. 120)
spontaneous recovery the reappearance, after a pause, of an extinguished conditioned response. (p. 276)	**recuperación espontánea** reaparición, después de una pausa, de una respuesta condicionada extinguida. (p. 276)
spotlight effect overestimating others' noticing and evaluating our appearance, performance, and blunders (as if we presume a spotlight shines on us). (p. 611)	**efecto reflector** sobreestimar cuánto las otras personas perciben y evalúan nuestra apariencia, desempeño y errores (como si supusiéramos que hay un reflector sobre nosotros). (p. 611)
SQ3R a study method incorporating five steps: *S*urvey, *Q*uestion, *R*ead, *R*etrieve, *R*eview. (p. 20)	**SQ3R** método de estudio en el que se siguen cinco pasos: Inspeccionar, Preguntar, Leer, Recitar, Repasar (*S*urvey, *Q*uestion, *R*ead,

	*R*etrieve, *R*eview, en inglés). (p. 20)
standard deviation a computed measure of how much scores vary around the mean score. (p. 68)	**desviación estándar** medición computada de cuánto varía cierta puntuación con respecto a la puntuación media. (p. 68)
standardization defining uniform testing procedures and meaningful scores by comparison with the performance of a pretested group. (p. 635)	**estandarización** definir procedimientos de medición uniformes y puntuaciones significativos mediante la comparación del desempeño de un grupo examinado con anterioridad. (p. 635)
Stanford-Binet the widely used American revision (by Terman at Stanford University) of Binet's original intelligence test. (p. 634)	**Stanford-Binet** revisión norteamericana (por Terman en la Universidad de Stanford) de la prueba original de inteligencia de Binet. Esta prueba es de uso extenso. (p. 634)
statistical significance a statistical statement of how likely it is that an obtained result occurred by chance. (p. 71)	**significancia estadística** declaración estadística de la probabilidad de que un resultado obtenido haya sido producto del azar.
stereotype a generalized (sometimes accurate but often overgeneralized) belief about a group of people. (p. 792)	**estereotipo** creencia (a veces acertada, pero frecuentemente demasiado generalizada) sobre las características de un grupo. (p. 792)
stereotype threat a self-confirming concern that one will be evaluated based on a negative stereotype. (p. 657)	**amenaza de estereotipos** preocupación autoconfirmada de que nos evaluarán con base en un estereotipo negativo. (p. 657)
stimulants drugs (such as caffeine, nicotine, and the more powerful cocaine, amphetamines, methamphetamine, and Ecstasy) that excite neural activity and speed up body functions. (p. 257)	**estimulantes** fármacos (tales como la cafeína, la nicotina y sustancias más poderosas como cocaína, anfetaminas, metanfetamina y éxtasis) que excitan la actividad neuronal y aceleran las funciones corporales. (p. 257)
stimulus any event or situation that evokes a response. (p. 271)	**estímulo** todo suceso o situación que provoca una respuesta. (p. 271)

storage the process of retaining encoded information over time. (p. 329)	**almacenamiento** retención a través del tiempo de información codificada. (p. 329)
strange situation a procedure for studying child-caregiver attachment; a child is placed in an unfamiliar environment while their caregiver leaves and then returns, and the child's reactions are observed. (p. 511)	**situación desconocida** procedimiento para estudiar el apego entre niño y cuidador; se coloca al niño en un entorno desconocido mientras su cuidador se va y regresa. Entretanto se observan las reacciones del niño. (p. 511)
stranger anxiety the fear of strangers that infants commonly display, beginning by about 8 months of age. (p. 509)	**miedo a los extraños** miedo a los extraños que manifiestan los bebés normalmente a partir de alrededor de los 8 meses de edad. (p. 509)
stress the process by which we perceive and respond to certain events, called *stressors*, that we appraise as threatening or challenging. (p. 450)	**estrés** proceso mediante el cual percibimos y respondemos a ciertos eventos llamados estresores, los cuales evaluamos como amenazantes o desafiantes. (p. 450)
structuralism an early school of thought promoted by Wundt and Titchener; used introspection to reveal the structure of the human mind. (p. 7)	**estructuralismo** escuela temprana de pensamiento promovida por Wundt y Titchener; usaba la introspección para revelar la estructura de la mente humana. (p. 7)
subjective well-being self-perceived happiness or satisfaction with life. Used along with measures of objective well-being (for example, physical and economic indicators) to evaluate people's quality of life. (p. 473)	**bienestar subjetivo** felicidad o satisfacción con la vida de uno mismo. Se emplea junto con medidas de bienestar objetivas (por ejemplo, con indicadores físicos y económicos) para evaluar nuestra calidad de vida. (p. 473)
subliminal below one's absolute threshold for conscious awareness. (p. 163)	**subliminal** aquello que ocurre por debajo de nuestro umbral absoluto de la consciencia. (p. 163)
substance use disorder a disorder characterized by continued substance craving and use despite significant life disruption and/or physical risk. (p. 253)	**trastornos causados por el uso de estupefacientes** trastorno caracterizado por el deseo prolongado de consumir una sustancia a pesar de los efectos negativos en la vida de quienes abusan de las sustancias y/o los riesgos físicos que implican. (p. 253)
superego	**supergo**

the part of personality that, according to Freud, represents internalized ideals and provides standards for judgment (the conscience) and for future aspirations. (p. 580)	en el psicoanálisis freudiano, componente de la personalidad que representa ideales internalizados y proporciona parámetros de juicio (la consciencia) y para fijarse metas futuras. (p. 580)
superordinate goals shared goals that override differences among people and require their cooperation. (p. 821)	**metas comunes** metas compartidas que hacen caso omiso de las diferencias entre las personas y que requieren su cooperación. (p. 821)
suprachiasmatic nucleus (SCN) a pair of cell clusters in the hypothalamus that controls circadian rhythm. In response to light, the SCN causes the pineal gland to adjust melatonin production, thus modifying our feelings of sleepiness. (p. 235)	**núcleo supraquiasmático (NSQ)** par de grupos de células en el hipotálamo que controlan el ritmo circadiano. Como respuesta a la luz, el núcleo supraquiasmático ajusta la producción de melatonina, modificando de esta manera los niveles de somnolencia. (p. 235)
survey a descriptive technique for obtaining the self-reported attitudes or behaviors of a particular group, usually by questioning a representative, *random sample* of the group. (p. 47)	**encuesta** técnica descriptiva para obtener actitudes o conductas del grupo autoinformadas por las personas; generalmente mediante preguntas que se le plantean a una *muestra aleatoria* y representativa de dicho grupo. (p. 47)
sympathetic nervous system the division of the autonomic nervous system that arouses the body, mobilizing its energy. (p. 93)	**sistema nervioso simpático** subdivisión del sistema nervioso autonómico que en despierta al cuerpo y moviliza su energía. (p. 93)
synapse [SIN-aps] the junction between the axon tip of the sending neuron and the dendrite or cell body of the receiving neuron. The tiny gap at this junction is called the *synaptic gap* or *synaptic cleft*. (p. 85)	**sinapsis** intersección entre el extremo del axón de una neurona que envía un mensaje y la dendrita o cuerpo celular de la neurona receptora. El pequeño espacio entre estos puntos de contacto se denomina *brecha sináptica* o *hendidura sináptica*. (p. 85)
systematic desensitization a type of exposure therapy that associates a pleasant relaxed state with gradually increasing anxiety-triggering stimuli. Commonly used to treat phobias. (p. 730)	**desensibilización sistemática** tipo de terapia de exposición en la cual se asocia un estado tranquilo y agradable con estímulos que van aumentando paulatinamente y que provocan ansiedad. De uso común para tratar fobias. (p. 730)
T	

telegraphic speech early speech stage in which a child speaks like a telegram—“go car”—using mostly nouns and verbs. (p. 384)	**habla telegráfica** etapa temprana del habla en la cuál los niños hablan como telegrama —“va carro”— mediante sustantivos y verbos principalmente. (p. 384)
temperament a person’s characteristic emotional reactivity and intensity. (p. 511)	**temperamento** reactividad e intensidad emocionales características de una persona. (p. 511)
temporal lobes the portion of the cerebral cortex lying roughly above the ears; includes the auditory areas, each receiving information primarily from the opposite ear. (p. 110)	**lóbulos temporales** región de la corteza cerebral ubicada aproximadamente encima de las orejas; incluye las áreas auditivas, que reciben información principalmente del oído opuesto. (p. 110)
tend-and-befriend response under stress, people (especially women) often provide support to others (tend) and bond with and seek support from others (befriend). (p. 455)	**respuesta de cuidarse y amigarse** en situaciones de estrés, las personas (sobre todo las mujeres) a menudo se dan apoyo (se cuidan), a la vez que forman vínculos y buscan apoyo de otros (amigarse). (p. 455)
teratogens (literally, “monster makers”) agents, such as chemicals and viruses, that can reach the embryo or fetus during prenatal development and cause harm. (p. 490)	**teratógeno** (literalmente, “creadores de monstruos”) agente, podría ser químico o viral, que pueden afectar al embrión o al feto durante el desarrollo prenatal, produciéndole daño. (p. 490)
terror-management theory a theory of death-related anxiety; explores people’s emotional and behavioral responses to reminders of their impending death. (p. 588)	**teoría del manejo del terror** teoría de la ansiedad relacionada con la muerte; explora las respuestas emotivas y conductuales de las personas ante recordatorios de su muerte inevitable. (p. 588)
testing effect enhanced memory after retrieving, rather than simply rereading, information. Also sometimes referred to as a *retrieval practice effect* or *test-enhanced learning*. (pp. 20, 335)	**efecto de prueba** recuerdo aumentado luego de recuperar la información, en lugar de simplemente volver a leerla. También conocido como *efecto de práctica de recuperación* o *aprendizaje intensificado por pruebas*. (pp. 20, 335)
testosterone the most important male sex hormone. Both males and females have it, but the additional testosterone in males stimulates the growth of the male sex organs during the fetal period	**testosterona** la hormona sexual masculina más importante. La tienen tanto los varones como las mujeres pero la cantidad adicional en los varones estimula el crecimiento de los

and the development of the male sex characteristics during puberty. (pp. 418, 545)	órganos sexuales masculinos durante el período fetal y el desarrollo de las características sexuales masculinas secundarias en la pubertad. (pp. 418, 545)
thalamus [THAL-uh-muss] the brain's sensory control center, located on top of the brainstem; it directs messages to the sensory receiving areas in the cortex and transmits replies to the cerebellum and medulla. (p. 102)	**tálamo** centro sensorial de control del cerebro ubicado encima del tronco encefálico; dirige mensajes sensoriales a la corteza cerebral y transmite respuestas al cerebelo y la médula. (p. 102)
THC the major active ingredient in marijuana; triggers a variety of effects, including mild hallucinations. (p. 262)	**THC** principal sustancia activa que se encuentra en la marihuana, produce distintos efectos, inclusive alucinaciones menores. (p. 262)
Thematic Apperception Test (TAT) a projective test in which people express their inner feelings and interests through the stories they make up about ambiguous scenes. (p. 584)	**prueba de apercepción temática (PAT)** prueba proyectiva en la que el individuo expresa sus sentimientos e intereses internos mediante historias que inventa en torno a escenas ambiguas. (p. 584)
theory an explanation using an integrated set of principles that organizes observations and predicts behaviors or events. (p. 42)	**teoría** explicación que emplea principios que organizan observaciones y predicen comportamientos o sucesos. (p. 42)
theory of mind people's ideas about their own and others' mental states—about their feelings, perceptions, and thoughts, and the behaviors these might predict. (p. 501)	**teoría de la mente** conceptos que tienen las personas acerca de sus propios procesos mentales y de los de los demás; es decir, de sus sentimientos, percepciones y pensamientos y de los comportamientos que estos podrían predecir. (p. 501)
therapeutic alliance a bond of trust and mutual understanding between a therapist and client, who work together constructively to overcome the client's problem. (p. 747)	**alianza terapéutica** vínculo de confianza y comprensión mutua que se establece entre el terapeuta y el cliente, que trabajan juntos de manera constructiva para superar el problema del cliente. (p. 747)
threshold the level of stimulation required to trigger a neural impulse. (p. 83)	**umbral** nivel de estimulación requerido para activar un impulso neuronal. (p. 83)
token economy	**economía de fichas**

an operant conditioning procedure in which people earn a token for exhibiting a desired behavior and can later exchange tokens for privileges or treats. (p. 732)	procedimiento del condicionamiento operante en el que las personas se ganan una ficha cuando exhiben un comportamiento deseado y luego pueden intercambiar las fichas ganadas por privilegios o para darse algún gusto. (p. 732)
tolerance the diminishing effect with regular use of the same dose of a drug, requiring the user to take larger and larger doses before experiencing the drug’s effect. (p. 255)	**tolerancia** disminución del efecto con el uso regular de la misma dosis de un fármaco, lo que requiere que el usuario tome dosis cada vez mayores para poder experimentar el efecto del fármaco. (p. 255)
top-down processing information processing guided by higher-level mental processes, as when we construct perceptions drawing on our experience and expectations. (p. 159)	**procesamiento de arriba hacia abajo** procesamiento de la información orientado por procesos mentales de alto nivel, como cuando construimos percepciones basándonos en nuestras vivencias y expectativas. (p. 159)
trait a characteristic pattern of behavior or a disposition to feel and act in certain ways, as assessed by self-report inventories and peer reports. (p. 596)	**rasgo** patrón de comportamiento característico o disposición a sentirse y actuar de cierta forma, según se evalúa en los inventarios de autoinformes e informes de pares. (p. 596)
transduction conversion of one form of energy into another. In sensation, the transforming of stimulus energies, such as sights, sounds, and smells, into neural impulses our brain can interpret. (p. 162)	**transducción** transformación de un tipo de energía en otro. En las sensaciones, transformación de las energías de los estímulos, tales como las imágenes, los sonidos y los olores, en impulsos neuronales que el cerebro tiene la capacidad de interpretar. (p. 162)
transference in psychoanalysis, the patient’s transfer to the analyst of emotions linked with other relationships (such as love or hatred for a parent). (p. 724)	**transferencia** en el psicoanálisis, la transferencia de emociones ligadas a otras relaciones, del paciente al analista (tales como el amor o el odio hacia el padre o la madre). (p. 724)
transgender an umbrella term describing people whose gender identity or expression differs from that associated with their birth-designated sex. (p. 526)	**transgénero** término genérico que describe a personas cuya identidad o expresión de género difiere de la que se asocia con su sexo al nacer. (p. 526)

two-factor theory the Schachter-Singer theory that to experience emotion one must (1) be physically aroused and (2) cognitively label the arousal. (p. 434)	**teoría de los dos factores** teoría de Schachter y Singer que propone que para experimentar emociones debemos (1) recibir estimulación física y (2) identificar el estímulo a nivel cognitivo. (p. 434)
two-word stage beginning about age 2, the stage in speech development during which a child speaks mostly in two-word statements. (p. 384)	**etapa de dos palabras** a partir de los 2 años de edad, etapa del desarrollo del lenguaje durante la cual el niño emite mayormente frases de dos palabras. (p. 384)
Type A Friedman and Rosenman’s term for competitive, hard-driving, impatient, verbally aggressive, and anger-prone people. (p. 459)	**Tipo A** término de Friedman y Rosenman para referirse a las personas competitivas, compulsivas, impacientes, verbalmente agresivas y con tendencia a enojarse. (p. 459)
Type B Friedman and Rosenman’s term for easygoing, relaxed people. (p. 459)	**Tipo B** término de Friedman y Rosenman para referirse a las personas tolerantes, relajadas y tranquilas. (p. 459)
U	
unconditional positive regard a caring, accepting, nonjudgmental attitude, which Carl Rogers believed would help clients develop self-awareness and self-acceptance. (pp. 592, 726)	**consideración positiva incondicional** actitud de cuidado, aceptación y parcialidad. Según Rogers, así los clientes desarrollarían consciencia y aceptación de sí mismos. (pp. 592, 726)
unconditioned response (UR) in classical conditioning, an unlearned, naturally occurring response (such as salivation) to an unconditioned stimulus (US) (such as food in the mouth). (p. 274)	**respuesta incondicionada (RI)** en el condicionamiento clásico, la respuesta no aprendida e innata que es producida por un estímulo incondicionado (EI) (como la salivación cuando la comida está en la boca). (p. 274)
unconditioned stimulus (US) in classical conditioning, a stimulus that unconditionally—naturally and automatically—triggers an unconditioned response UR). (p. 274)	**estímulo incondicionado (EI)** en el condicionamiento clásico, estímulo que provoca una respuesta incondicionalmente (RI) y de manera natural y automática. (p. 274)
unconscious according to Freud, a reservoir of mostly	**inconsciente** según Freud, un depósito de pensamientos,

unacceptable thoughts, wishes, feelings, and memories. According to contemporary psychologists, information processing of which we are unaware. (p. 579)	deseos, sentimientos y recuerdos, en su mayoría inaceptables. Según los psicólogos contemporáneos, el procesamiento de información del cual no tenemos consciencia. (p. 579)
V	
validity the extent to which a test or experiment measures or predicts what it is supposed to. (See also *content validity* and *predictive validity*.) (pp. 56, 636)	**validez** grado en que una prueba mide o predice lo que se supone debe medir o predecir. (Ver también *validez del contenido* y *validez predictiva*.) (pp. 56, 636)
variable anything that can vary and is feasible and ethical to measure. (p. 51)	**variable** todo aquello que varía y que es viable y ético para ser medido. (p. 51)
variable-interval schedule in operant conditioning, a reinforcement schedule that reinforces a response at unpredictable time intervals. (p. 288)	**calendario de intervalo variable** según el condicionamiento operante, calendario de reforzamientos que refuerza una respuesta en intervalos de tiempo impredecibles. (p. 288)
variable-ratio schedule in operant conditioning, a reinforcement schedule that reinforces a response after an unpredictable number of responses. (p. 288)	**plan de proporción variable** en el condicionamiento operante, plan de reforzamientos que refuerza una respuesta después de un número impredecible de respuestas. (p. 288)
vestibular sense our sense of body movement and position that enables our sense of balance. (p. 213)	**sentido vestibular** sentido de movimiento y posición del cuerpo que habilita nuestro sentido de equilibrio (p. 213)
virtual reality exposure therapy a counterconditioning technique that treats anxiety through creative electronic simulations in which people can safely face their greatest fears, such as airplane flying, spiders, or public speaking. (p. 730)	**terapia de exposición a una realidad virtual** técnica del contracondicionamiento que trata la ansiedad mediante estimulaciones electrónicas creativas en en las cuales las personas enfrentan a sus temores más grandes, como volar en avión, ver una araña o hablar en público. (p. 730)
visual cliff a laboratory device for testing depth perception in infants and young animals. (p. 189)	**precipicio visual** dispositivo del laboratorio con el que se examina la percepción de profundidad en los bebés y en animales de corta edad. (p. 189)

W	
wavelength the distance from the peak of one light or sound wave to the peak of the next. Electromagnetic wavelengths vary from the short blips of gamma rays to the long pulses of radio transmission. (p. 177)	**longitud de onda** distancia entre la cresta de una onda de luz o de sonido y la cresta de la siguiente onda. La longitud de las ondas electromagnéticas varían entre la señal corta de los rayos gamma y los pulsos largos de la radio transmisión. (p. 177)
Weber’s law the principle that, to be perceived as different, two stimuli must differ by a constant minimum percentage (rather than a constant amount). (p. 165)	**ley de Weber** principio que sostiene que para que dos estímulos se perciban como distintos, estos deben diferir por un porcentaje mínimo constante (en vez de por una cantidad constante).165)
Wechsler Adult Intelligence Scale (WAIS) the WAIS and its companion versions for children are the most widely used intelligence tests; they contain verbal and performance (nonverbal) subtests. (p. 635)	**escala de la Inteligencia de Wechsler para adultos (EIWA)** la prueba EIWA y su versión adaptada para niños son las pruebas de inteligencia más ampliamente utilizadas. Incluyen subpruebas verbales y de desempeño (no verbales). (p. 635)
Wernicke’s area a brain area involved in language comprehension and expression; usually in the left temporal lobe. (p. 388)	**área de Wernicke** parte del cerebro generalmente ubicada en el lóbulo temporal izquierdo, que participa en la comprensión y la expresión del lenguaje, y que controla la recepción del mismo. (p. 388)
withdrawal the discomfort and distress that follow discontinuing an addictive drug or behavior. (p. 255)	**síndrome de abstinencia** la incomodidad y angustia que resulta cuando se deja de utilizar un estupefaciente adictivo o se suspende una conducta. (p. 255)
working memory a newer understanding of short-term memory that adds conscious, active processing of incoming auditory and visual information, and of information retrieved from long-term memory. (p. 329)	**memoria operativa** entendimiento más reciente de la memoria a corto plazo que añade el procesamiento consciente y activo de información auditiva y visual-espacial, y de información recuperada de la memoria a largo plazo. (p. 329)
X	

X chromosome the sex chromosome found in both males and females. Females typically have two X chromosomes; males typically have one. An X chromosome from each parent produces a female child. (p. 545)	**cromosoma X** cromosoma del sexo que se encuentra en el varón y en la mujer. Las mujeres por lo general tienen dos cromosomas X; los hombres por lo general tienen un cromosoma X y un cromosoma Y. Con un cromosoma X del padre y otro de la madre, se produce una mujer. (p. 545)
Y	
Y chromosome the sex chromosome typically found only in males. When paired with an X chromosome from the mother, it produces a male child. (p. 545)	**cromosoma Y** cromosoma del sexo que solamente se halla en los hombres. Cuando se aparea con un cromosoma X de la madre, produce un varón. (p. 545)
Yerkes-Dodson law the principle that performance increases with arousal only up to a point, beyond which performance decreases. (p. 404)	**Ley de Yerkes-Dodson** principio que establece que el rendimiento aumenta con la excitación solamente hasta un punto; más allá de este punto el rendimiento disminuye. (p. 404)
Young-Helmholtz trichromatic (three-color) theory the theory that the retina contains three different types of color receptors—one most sensitive to red, one to green, one to blue—which, when stimulated in combination, can produce the perception of any color. (p. 181)	**teoría tricromática de Young-Helmholtz** teoría de que la retina contiene tres tipos distintos de receptores de color: uno más sensible al rojo, otro al verde y otro al azul. Al estimularse en conjunto, estos receptores son capaces de producir la percepción de cualquier color. (p. 181)
Z	
zygote the fertilized egg; it enters a 2-week period of rapid cell division and develops into an embryo. (p. 489)	**cigoto** huevo fertilizado. Atraviesa por un período de dos semanas de división celular rápida y se convierte en un embrión. (p. 489)

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Footnotes

Module 1

[1] If you are a student using these Multiple-Choice Questions for self-testing, please consult with your teacher to check your answers.

Module 2

[1] Confession: I [DM] wrote the last part of this sentence on April Fool's Day.

[2] Also sometimes called "*R*ecite."

Module 4

[1] Boston is south of Paris.

[2] The anagram solution: CHAOS

Module 5

[1] These researchers were able to carefully observe and record naturally occurring behaviors outside the artificiality of a laboratory. However, outside the lab they were not able to control for all the factors that may have influenced the everyday interactions they were recording.

Module 6

[1] negative

[2] positive

[3] positive

[4] negative

[5] In this case, as in many others, a third factor can explain the correlation: Golden anniversaries and baldness both accompany aging.

[6] The *independent variable,* which the researchers manipulated, was the ethnicity-related names. The *dependent variable,* which they measured, was the positive response rate.

Module 9

[1] ANSWER: Morphine is an agonist; curare is an antagonist.

Module 11

[1] Answer: The cat would be aroused via its sympathetic nervous system.

Module 13

[1] So, would the reverse damage lead to the opposite symptoms? Indeed, there are a few such patients—who can see and recognize objects but have difficulty pointing toward or grasping them.

Module 17

[1] The title's first error is its repeated "The." Its ironic second error is its misstatement that there are two errors, when there is only one.

Module 18

[1] Answer: Your blind spot is on the nose side of each retina, which means that objects to your right may fall onto the right eye's blind spot. Objects to your left may fall on the left eye's blind spot. The blind spot does not normally impair your vision, because your eyes are moving and because one eye catches what the other misses. Moreover, even with only one eye open, our brain gives us a perception without a hole in it.

Module 25

[1] This analogy, adapted here with world-based numbers, was suggested by mathematician Sam Saunders, as reported by K. C. Cole (1998).

Module 26

[1] The “buzzer” (English translation) was perhaps the bell people commonly associate with Pavlov (Tully, 2003). Pavlov used various stimuli, but some have questioned whether he used a bell.

[2] ANSWER: generalization

[3] ANSWER: The US was the loud noise; the UR was the fear response to the noise; the NS was the rat before it was paired with the noise; the CS was the rat after pairing; the CR was fear of the rat.

Module 27

[1] ANSWER: The baby negatively reinforces her parents’ behavior when she stops crying once they grant her wish. Her parents positively reinforce her cries by letting her sleep with them.

Module 33

[1] One of my cookie-scarfing sons, on reading this in his father’s textbook years later, confessed he had fibbed “a little.”

[2] bicycle, void, cigarette, inherent, fire, process

Module 35

[1] Answer to SPLOYOCHYG anagram: PSYCHOLOGY.

[2] The word is *apple:* pineapple, crabapple, applesauce.

[3] The first answer is 5 cents. The bat would then cost $1.05, for a $1.10 total. If the ball cost the intuitive answer of 10 cents, the bat would then have to cost $1.10 (for a bat-and-ball total of $1.20, not $1.10). The second answer is 5 minutes, because each machine makes a widget every 5 minutes. If you answered incorrectly, don’t feel bad—so do most university students (Frederick, 2005).

Module 36

[1] How did you illustrate “the girl pushes the boy”? Anne Maass and Aurore Russo (2003) report that people whose language reads from left to right mostly position the pushing girl on the left. Those who read and write Arabic, a right-to-left language, mostly place her on the right. This spatial bias appears only in those old enough to have learned their culture’s writing system (Dobel et al., 2007).

Module 40

[1] Note: The researchers later *debriefed* and reassured the participants.

Module 42

[1] From left to right, top to bottom: happiness, surprise, fear, sadness, anger, disgust.

[2] ANSWERS: (1) Most students report feeling more happy than sad when their cheeks are raised upward. (2) Most students report feeling more sad than happy when their cheeks are pulled downward.

Module 45

[1] By one careful estimate, the average human has 37.2 trillion cells (Bianconi et al., 2013).

Module 53

[1] Answer: Figure (c)

Module 59

[1] We couldn’t resist throwing that in. But don’t worry, you won’t be tested on floccinaucinihilipilification, which is the act of estimating something as worthless (and was the longest nontechnical word in the first edition of the *Oxford English Dictionary*).

Module 64

[1] ANSWER: The correct answer is c.

Module 65

[1] A book of case illustrations accompanying the previous DSM edition provided several examples for this unit.

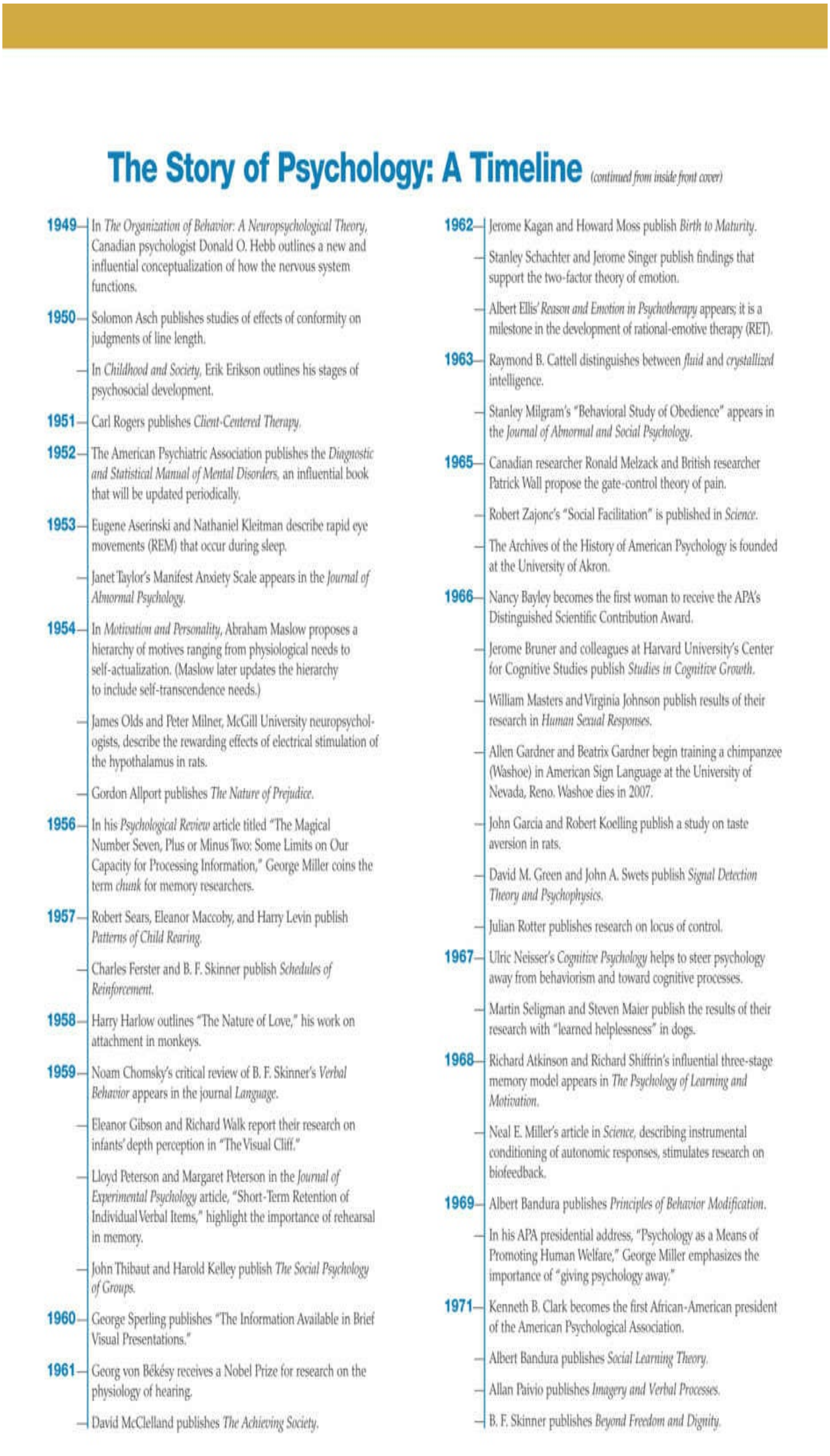
Module 66

[1] OCD and PTSD were formerly classified as anxiety disorders, but the DSM-5 now classifies them separately.

[2] Because the behaviors result in removal or reduction of unpleasant anxiety, they are examples of *negative reinforcement*.

Appendix D

[1] Although this appendix draws primarily from available U.S. data, its descriptions of psychology’s subfields and suggestions for preparing for further psychology studies are applicable to students in many other countries.



The Story of Psychology: A Timeline *(continued from inside front cover)*

- **1949** In *The Organization of Behavior: A Neuropsychological Theory,* Canadian psychologist Donald O. Hebb outlines a new and influential conceptualization of how the nervous system functions.
- **1950** Solomon Asch publishes studies of effects of conformity on judgments of line length.
- In *Childhood and Society,* Erik Erikson outlines his stages of psychosocial development.
- **1951** Carl Rogers publishes *Client-Centered Therapy.*
- **1952** The American Psychiatric Association publishes the *Diagnostic and Statistical Manual of Mental Disorders,* an influential book that will be updated periodically.
- **1953** Eugene Aserinski and Nathaniel Kleitman describe rapid eye movements (REM) that occur during sleep.
- Janet Taylor's Manifest Anxiety Scale appears in the *Journal of Abnormal Psychology.*
- **1954** In *Motivation and Personality,* Abraham Maslow proposes a hierarchy of motives ranging from physiological needs to self-actualization. (Maslow later updates the hierarchy to include self-transcendence needs.)
- James Olds and Peter Milner, McGill University neuropsychologists, describe the rewarding effects of electrical stimulation of the hypothalamus in rats.
- Gordon Allport publishes *The Nature of Prejudice.*
- **1956** In his *Psychological Review* article titled "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information," George Miller coins the term *chunk* for memory researchers.
- **1957** Robert Sears, Eleanor Maccoby, and Harry Levin publish *Patterns of Child Rearing.*
- Charles Ferster and B. F. Skinner publish *Schedules of Reinforcement.*
- **1958** Harry Harlow outlines "The Nature of Love," his work on attachment in monkeys.
- **1959** Noam Chomsky's critical review of B. F. Skinner's *Verbal Behavior* appears in the journal *Language.*
- Eleanor Gibson and Richard Walk report their research on infants' depth perception in "The Visual Cliff."
- Lloyd Peterson and Margaret Peterson in the *Journal of Experimental Psychology* article, "Short-Term Retention of Individual Verbal Items," highlight the importance of rehearsal in memory.
- John Thibaut and Harold Kelley publish *The Social Psychology of Groups.*
- **1960** George Sperling publishes "The Information Available in Brief Visual Presentations."
- **1961** Georg von Békésy receives a Nobel Prize for research on the physiology of hearing.
- David McClelland publishes *The Achieving Society.*
- **1962** Jerome Kagan and Howard Moss publish *Birth to Maturity.*
- Stanley Schachter and Jerome Singer publish findings that support the two-factor theory of emotion.
- Albert Ellis' *Reason and Emotion in Psychotherapy* appears; it is a milestone in the development of rational-emotive therapy (RET).
- **1963** Raymond B. Cattell distinguishes between *fluid* and *crystallized* intelligence.
- Stanley Milgram's "Behavioral Study of Obedience" appears in the *Journal of Abnormal and Social Psychology.*
- **1965** Canadian researcher Ronald Melzack and British researcher Patrick Wall propose the gate-control theory of pain.
- Robert Zajonc's "Social Facilitation" is published in *Science.*
- The Archives of the History of American Psychology is founded at the University of Akron.
- **1966** Nancy Bayley becomes the first woman to receive the APA's Distinguished Scientific Contribution Award.
- Jerome Bruner and colleagues at Harvard University's Center for Cognitive Studies publish *Studies in Cognitive Growth.*
- William Masters and Virginia Johnson publish results of their research in *Human Sexual Responses.*
- Allen Gardner and Beatrix Gardner begin training a chimpanzee (Washoe) in American Sign Language at the University of Nevada, Reno. Washoe dies in 2007.
- John Garcia and Robert Koelling publish a study on taste aversion in rats.
- David M. Green and John A. Swets publish *Signal Detection Theory and Psychophysics.*
- Julian Rotter publishes research on locus of control.
- **1967** Ulric Neisser's *Cognitive Psychology* helps to steer psychology away from behaviorism and toward cognitive processes.
- Martin Seligman and Steven Maier publish the results of their research with "learned helplessness" in dogs.
- **1968** Richard Atkinson and Richard Shiffrin's influential three-stage memory model appears in *The Psychology of Learning and Motivation.*
- Neal E. Miller's article in *Science,* describing instrumental conditioning of autonomic responses, stimulates research on biofeedback.
- **1969** Albert Bandura publishes *Principles of Behavior Modification.*
- In his APA presidential address, "Psychology as a Means of Promoting Human Welfare," George Miller emphasizes the importance of "giving psychology away."
- **1971** Kenneth B. Clark becomes the first African-American president of the American Psychological Association.
- Albert Bandura publishes *Social Learning Theory.*
- Allan Paivio publishes *Imagery and Verbal Processes.*
- B. F. Skinner publishes *Beyond Freedom and Dignity.*

1972
- Elliot Aronson publishes *The Social Animal.*
- Fergus Craik and Robert Lockhart's "Levels of Processing: A Framework for Memory Research" appears in the *Journal of Verbal Learning and Verbal Behavior.*
- Robert Rescorla and Allan Wagner publish their associative model of Pavlovian conditioning.
- Under the leadership of Derald Sue and Stanley Sue, the Asian American Psychological Association is founded.

1973
- Ethologists Karl von Frisch, Konrad Lorenz, and Nikolaas Tinbergen receive the Nobel Prize for their research on animal behavior.

1974
- APA's Division 2 first publishes its journal, *Teaching of Psychology,* with Robert S. Daniel as editor.
- Eleanor Maccoby and Carol Jacklin publish *The Psychology of Sex Differences.*

1975
- Biologist Edward O. Wilson's *Sociobiology* appears; it will be a controversial precursor to evolutionary psychology.

1976
- Sandra Wood Scarr and Richard A. Weinberg publish "IQ Test Performance of Black Children Adopted by White Families" in *American Psychologist.*
- Psychologist Robert V. Guthrie publishes *Even the Rat Was White,* the first history of African-American psychologists in America.

1978
- Psychologist Herbert A. Simon, Carnegie-Mellon University, wins a Nobel Prize for pioneering research on computer simulations of human thinking and problem solving.

1979
- James J. Gibson publishes *The Ecological Approach to Visual Perception.*
- Elizabeth Loftus publishes *Eyewitness Testimony.*

1981
- David Hubel and Torsten Wiesel receive a Nobel Prize for research on single-cell recordings that identified feature detector cells in the visual cortex.
- Roger Sperry receives a Nobel Prize for research on split-brain patients.
- Paleontologist Stephen Jay Gould publishes *The Mismeasure of Man,* highlighting the debate concerning biological determination of intelligence.

1983
- In his *Frames of Mind,* Howard Gardner outlines his theory of multiple intelligences.

1984
- The American Psychological Association creates Division 44 (Society for the Psychological Study of Lesbian and Gay Issues).
- Robert Sternberg proposes the triarchic theory of human intelligence in *Behavioral and Brain Sciences.*

1987
- Elizabeth Scarborough and Laurel Furumoto publish *Untold Lives: The First Generation of American Women Psychologists.*
- Fluoxetine (Prozac) is introduced as a treatment for depression.
- Wilbert J. McKeachie, University of Michigan, receives the first APA Award for Distinguished Career Contributions to Education and Training in Psychology.

1988
- The American Psychological Society is founded. It changes its name to Association for Psychological Science in 2006.

1990
- Psychiatrist Aaron Beck receives the Distinguished Scientific Award for the Applications of Psychology for advancing understanding and treatment of psychopathology, including pivotal contributions to the development of cognitive therapy.
- B. F. Skinner receives APA's first Citation for Outstanding Lifetime Contributions to Psychology and presents his last public address, "Can Psychology Be a Science of Mind?" (He died a few days later at age 86.)

1991
- Martin Seligman publishes *Learned Optimism,* which foreshadows the "positive psychology" movement.

1992
- Teachers of Psychology in Secondary Schools (TOPSS) is established as part of the APA.
- About 3,000 U.S. secondary school students take the first Advanced Placement (AP) Examination in Psychology, hoping to earn exemption from an introductory psychology course at the postsecondary level.

1993
- Psychologist Judith Rodin is elected president of the University of Pennsylvania, becoming the first female president of an Ivy League school.

1996
- Dorothy Cantor becomes the first president of the APA with a Psy.D. degree.

2002
- New Mexico becomes the first U.S. state to allow qualified clinical psychologists to prescribe certain drugs.
- Psychologist Daniel Kahneman, Princeton University, receives a Nobel Prize for research on decision making.

2011
- Proposed by participants at the 2008 national conference at the University of Puget Sound, the document, "Principles for Quality Undergraduate Education in Psychology," is approved as official APA policy.

2013
- U.S. President Barack Obama announces $100 million in funding for an interdisciplinary project to advance understanding of the human brain.

2015
- The *Independent Review Relating to APA Ethics Guidelines, National Security Interrogations, and Torture* is presented to the American Psychological Association.

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